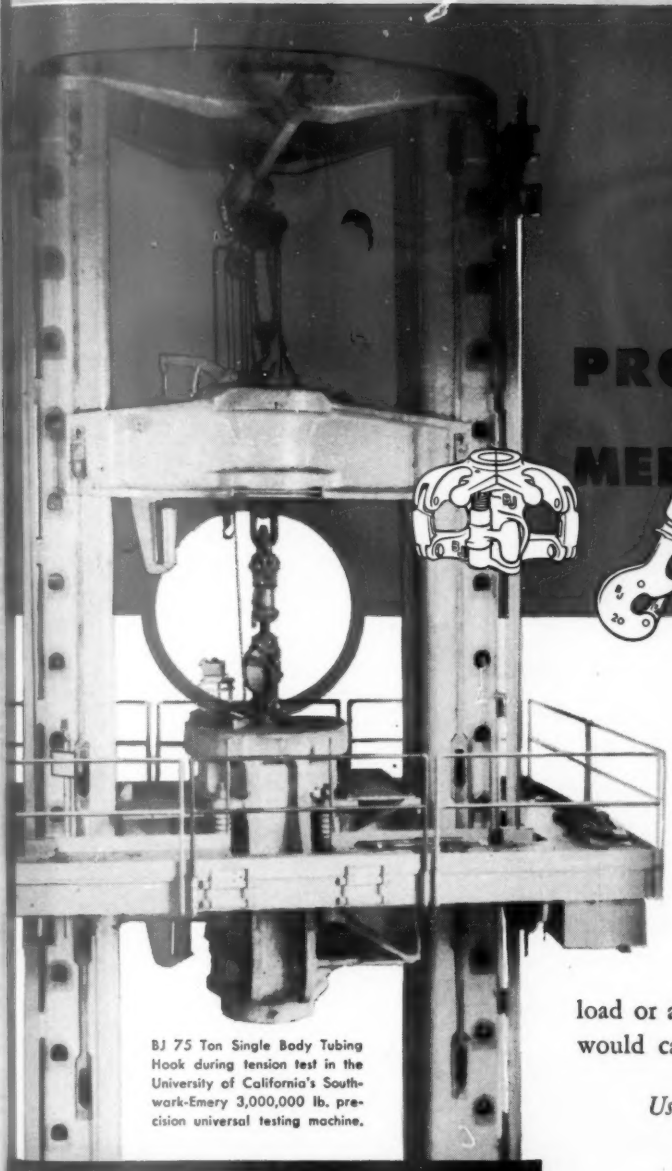
the OIL AND GAS JOURNAL



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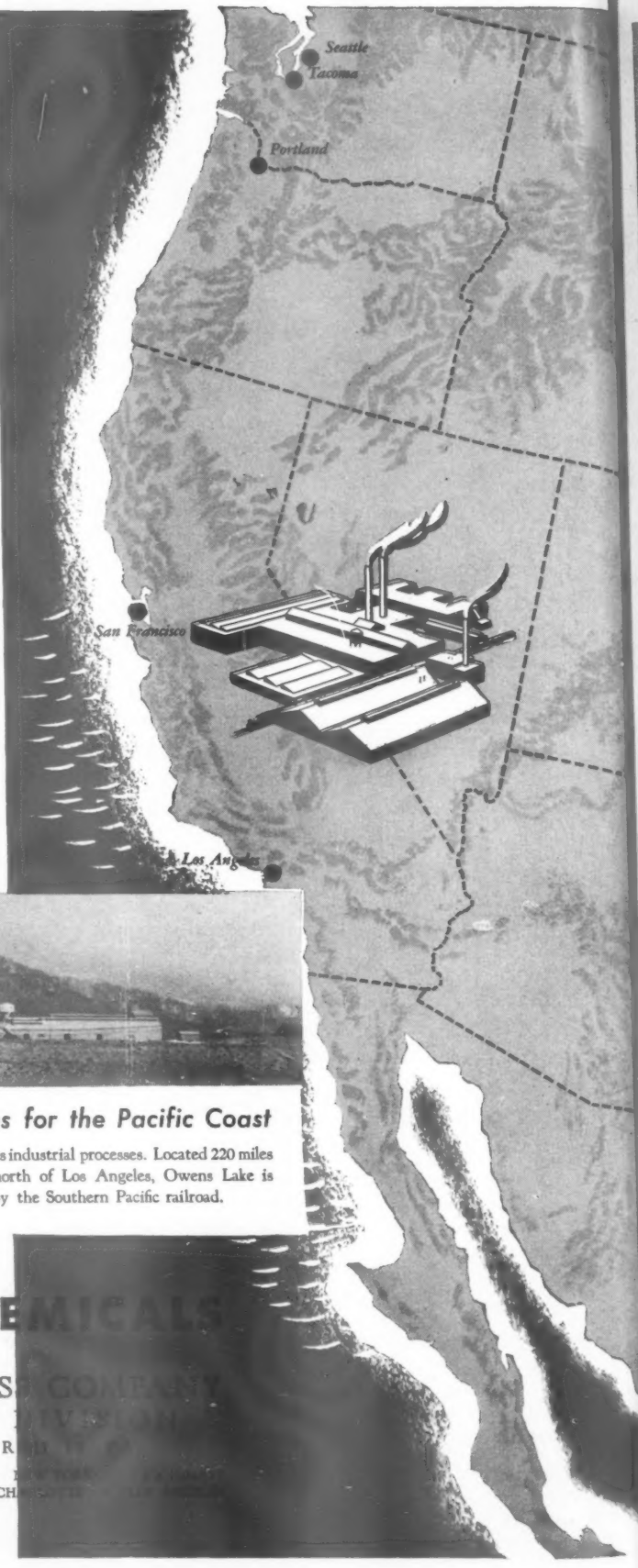

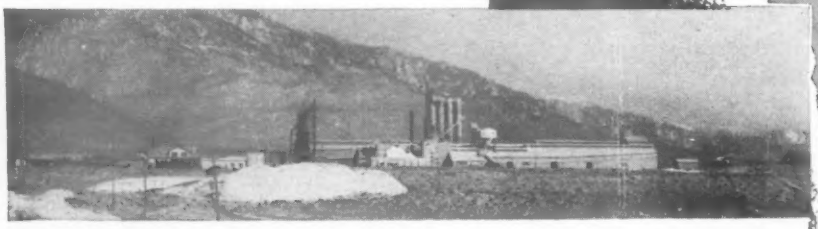

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the OIL AND GAS JOURNAL

published weekly by the

PETROLEUM PUBLISHING COMPANY

211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

Subscription rate to the petroleum industry, United States and foreign, 1 year, $6.00; 2 years, $10.00; 3 years, $12.00; 5 years, $15.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

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Vol. 43, No. 36 January 13, 1945

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As One Oil Man to Another . . .

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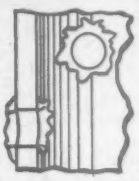

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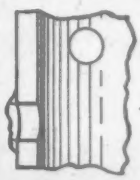

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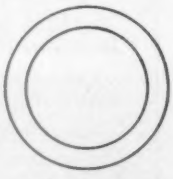

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Trends

Crude-Oil Production By States—Page 106

CRUDE-OIL STOCKS 222,998,000 bbl. as of December 30—up 423,000 bbl. One year ago 240,992,000 bbl.

GASOLINE STOCKS 86,614,000 bbl. as of December 30—up 3,249,000 bbl. One year ago 75,327,000 bbl.

RESIDUAL FUEL-OIL STOCKS 57,430,000 bbl. as of December 30—down 1,079,000 bbl. One year ago 56,773,000 bbl.

GAS OIL AND DISTILLATE STOCKS 39,495,000 bbl. as of December 30—down 1,351,000 bbl. One year ago 41,728,000 bbl.

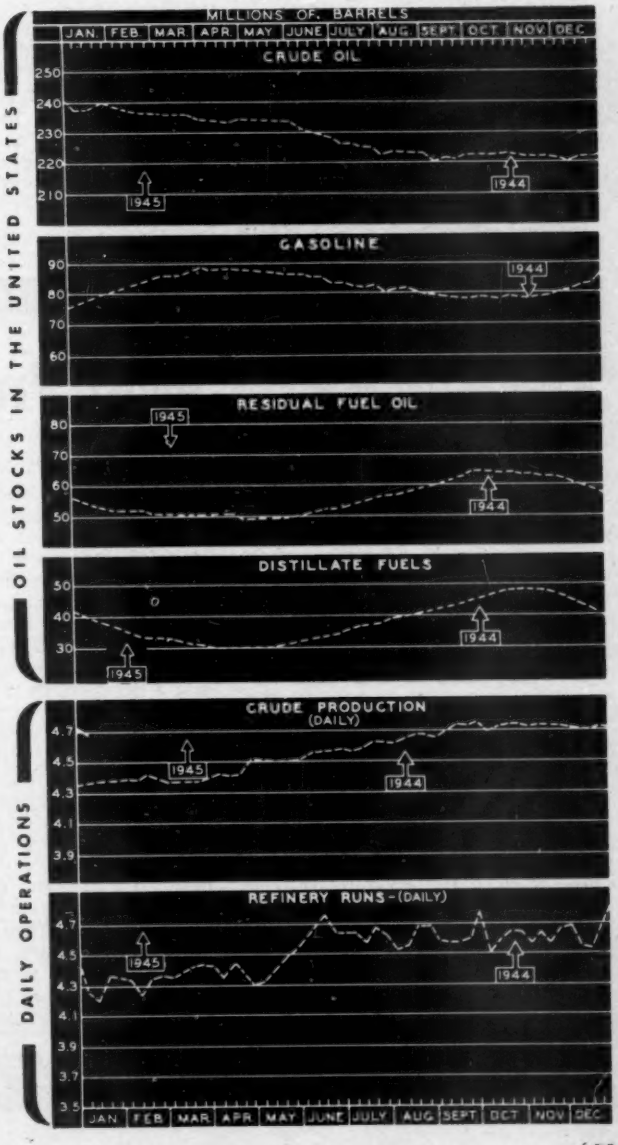
CRUDE-OIL PRODUCTION 4,677,350 bbl. as of January 6—down 37,000 bbl. One year ago 4,366,220 bbl.

REFINERY RUNS 4,798,000 bbl. daily week ended December 30—up 116,000 bbl. One year ago 4,471,000.

THOUGH little is being said about it in official circles, those within the industry who are most familiar with conditions are concerned as to how the demands for medium and high-gravity crude oils are to be met during the next few months. The situation is not new, as operating trends over the past 2 years with steady withdrawals from stocks, have pointed to a shortage of the most desirable grades of crude oil, if demands continued to expand. Had the European war ended in late 1944, as many had anticipated, there would have been an easing in this situation, and no supply problems would have developed which could not be readily solved. Military developments now assure increased demands which can only be supplied by expanding the processing of certain crudes.

MANUFACTURING conditions are primarily responsible for this situation, although transportation shortages are also a factor. In general the largest yields of war products are obtainable from the high-gravity sweet crudes. This applies not only to all grades of military and civilian gasolines, but also diesel fuels, furnace oils, special grades of lubricating oils and a number of specialties for which there is a heavy war demand. While some of the larger refiners before Pearl Harbor installed equipment to refine completely the lower-gravity and sour crudes, the output of war products from these operations is relatively small. In installing new equipment the policy has been to favor operations based on sweet crudes. The sour crudes require the use of critical materials, and repair and maintenance are greater than in the case of the sweet-crude operations. There has been some increase in the utilization of sour crudes at smaller plants which are charging blends of sour and sweet crudes to their stills. But it is apparent from the reported results of these operations that there are definite limits as to what can be done in this type of processing.

THERE has been a further development, partially reflected by the charts and data of this page, which tends to stress the desirability of increasing the output of light crudes. Supplies of residual fuel oils are adequate and excess storage is reported at some points. The bulk of this production comes from the low-gravity crudes, which means that at present a better operating balance can be obtained with the light crudes.



Committee to Consider Costs, Looking to Price Revisions

by Henry D. Ralph

WASHINGTON.—A National Crude Oil Industry Advisory Committee of 23 members, appointed by Office of Price Administration, will hold its first meeting in Washington January 15.

The chief business will be consideration of oil-production costs, looking to a possible upward revision in OPA price ceilings. OPA officials will outline a plan for a cost questionnaire and ask advice on the most practical methods of conducting the survey and interpreting its results. Preliminary work done by OPA suggests that its project may receive immediate approval from the committee and that the cost study will get under way promptly.

Independent Petroleum Association of America is not expected to go through with its announced plan to file a formal protest with OPA against present crude price ceilings, although it is still obtaining power-of-attorney statements from producers. It was originally planned to file this protest on or before January 15, but officials state that no action will be taken before the committee meets and that steps taken by the committee may make the protest unnecessary or inadvisable. This change in plans probably resulted from discovery that OPA regulations require that a formal protest be given preferred treatment, which might result in preventing the proposed cost study or any action by the advisory committee. The protest, however, could be filed at any time in the future if it should appear that the cost study had bogged down.

May Meet Several Days

The advisory committee may remain in session for several days in order to consider all details of the cost study, since OPA wants complete industry agreement on methods before undertaking the work. OPA has been advised by sampling experts that 100 per cent returns from a small but carefully selected cross section of an industry will give a more accurate picture of costs than a small percentage of scattered returns from the entire industry.

For this reason OPA will ask for a list of 400 to 600 representative producers of various sizes and in different areas which the committee considers a fair sample, though a larger list will be used if the committee thinks advisable. Once the sampling list is picked, every effort will be made to obtain a reply from each producer receiving a questionnaire.

The form of the questionnaire and the accounting data to be used will be determined by the committee. After the returns have been received OPA probably will call the committee to Washington again for advice on compilation and interpretation of the data.

Since this is a general crude-oil industry advisory committee, it could take up other problems, such as application of the stripper-well subsidy, but OPA hopes to have the discussion at the first meeting confined as closely as possible to the cost study. Some members of the committee have indicated that they could not spare time to serve on a permanent committee to work with OPA on all problems which might arise, so the committee may be reconstituted later if OPA considers it wise to dissolve its present five regional crude oil committees and handle all problems through a single national committee.

The committee, comprising independent producers and representatives of major producing companies, follows: John G. Pew, Sun Oil Co.; Dana Kelsey, Sinclair Prairie Oil Co.; W. H. Morgan, R. R. Bush Oil Co.; E. B. Reeser, Barnsdall Oil Co.; Charles F. Roeser, Roeser & Pendleton Inc.; Howard J. Whitehill, Whitehill Oil Corp.; J. P. Jones, Bradford, Pa.; George Bays, Stanolind Oil & Gas Co.; J. D. Sandefer, Jr., Breckenridge, Tex.; J. P. Coleman, McCarty & Coleman; H. M. McClure, Alma, Mich.; Raymond B. Kelly, Pure Oil Co.; N. W. Shiarella, Miller & Shiarella; Maj. B. A. Hardey, Louisiana Mineral Board; E. P. Potter, Amerada Petroleum Corp.; A. C. Rubel, Union Oil Co. of California; Edwin W. Hayes, Independence, Kans.; Merle Becker, W. C. McBride Inc.; Carl P. Reistle, Humble Oil & Ref. Co.; Dr. W. B. Emery, Ohio Oil Co.; G. P. Watson, Seaboard Oil Co.; James W. Johnson, Consolidated Gas Co.; Gilbert J. Mueller, Argo Oil Co.

Government Action Needed to Boost Production, Congress Told

WASHINGTON. — Every government action possible should be taken to encourage exploration and increase production of crude petroleum, Congress was told in a report by the petroleum subcommittee of the House committee on interstate and foreign commerce.

Measures specifically recommended were a higher price for crude and a reversal, by congressional action if necessary, of a ruling of Bureau of Internal Revenue requiring capitalization of certain geological and geophysical expenditures.

The report, signed by Chairman Clarence F. Lea, of California, and all other members of the subcommittee, was a general review of the petroleum situation during the past year and its relationship to the war program. It contained high praise for the oil industry, Petroleum Administration for War, and particularly for the close cooperation between the industry and the Government.

One problem discussed was that of increasing the use of foreign petroleum for the war, particularly construction of additional refining capacity abroad. The committee observed that overlapping jurisdiction of PAW and Foreign Economic Administration complicates the shipment of materials for this purpose, and suggested that the procedure be improved.

In discussing crude production and price, the committee report said: "The persistent decline in the volume of new oil discovered and the decreased discovery per well demonstrates the necessity of appropriate measures to increase exploratory drilling to match our consumption, if possible. Such a program is desirable, both from the standpoint of a possible oil need in case of the indefinite postponement of victory, and also to provide a secure source of oil from the standpoint of a long-range supply of petroleum products.

"There is an admitted high cost at which these small operators produce. Their early abandonment cannot be justified, because we need their product for current uses, and we need it for its ultimate conser-

vation. This situation justifies a plan for higher priced payments to these small producers to save their product for the public need. Oil, from the standpoint of its inherent value, is one of the cheapest products that money can buy.

"This committee has heretofore expressed its approval of proper prices to give the producer of crude oil a reasonable price for his product. We believe that the production of crude is an industry in itself, and that it should be placed on a healthy self-supporting basis in its own right, and not be made dependent upon a better income from the refining, transportation, or distribution phases of the oil industry.

"The Government, through its appropriate agencies, has set up a subsidy plan which to a degree will encourage at least a limited number of marginal producers by affording them higher compensation for their product. The independent producers who are responsible for the major part of oil discoveries still bitterly protest what they regard as the inadequacy of the government subsidy plan.

Relation to Costs Essential

"In any event, from the standpoint of preserving a healthy industry, prices must provide reasonable compensation and have a changing relation in proportion to costs. We suggest the importance of a further impartial and thorough investigation which would seek a solution of the price problem from that standpoint.

"Practices of the Bureau of Internal Revenue in totaling certain geological and geophysical expenditures as capitalization, instead of allowing them to be charged off as expenditures as in the past, retards the production of oil," said the report. "It is recommended that the matter be given legislative attention by the Congress. Burdensome routine and delays in securing materials for foreign operations and the license to operate same should be corrected."

Noting that refineries were preparing to produce a superfuel to afford greater flight power and maneuverability in air navigation, the report advocated giving oil experts permission to return to liberated areas in Europe and rehabilitate vital petroleum facilities for accelerating the war effort and reducing demands on the oil preserves of this country.

The country's production of total petroleum liquids from fields and plants set a new all-time record of 5,054,000 bbl. daily during September, the subcommittee disclosed. Production of crude oil increased between December of 1943 and September of 1944 from 4,360,000 bbl. daily to 4,766,000 as against a mark of 3,843,000 bbl. daily in 1941.

Refiners and Natural-Gasoline Manufacturers Protest Against Tank-Car-Demurrage Order

WASHINGTON.—Stirred by an order issued December 23 by Interstate Commerce Commission, imposing demurrage charges on tank cars standing on railroad sidings, refiners and natural-gasoline manufacturers throughout the country have been sending a stream of protesting telegrams to the commission and to Office of Defense Transportation. The order was prompted by a recommendation of the tank-car advisory committee of ODT.

The good intentions of ICC and ODT are not questioned, but instead of stimulating the movement of tank cars, it is declared the order defeats its purpose and is hampering such movement.

The order requires that after expiration of 24 hours free time, demurrage charges shall be $5.50 for each car the first day, $11 for the second day and $22 daily thereafter. No demurrage charges are in effect at the present time.

Previous Rights Canceled

The right of reconsignment and diversion of tank cars is canceled.

Concerned over the situation unexpectedly created, the tank-car advisory committee met here January 8 to consider what action, if any, should be taken.

A telegram from one major refiner says:

"We are convinced that in many instances tank cars will be seriously delayed. There will be more delay and confusion in the loading of orders for the Army and Navy of critical material unless the order is changed to cover certain situations which we would like to have an opportunity to present to you. We are convinced that cancellation of diversion privilege will result in disastrous delays. Many points of loading are now supplied with tank cars by diverting them en route rather than permitting empty cars to reach home points and rebilling to other points of loading.

"Typographical and other errors in billing under this order cannot be corrected and changes can only be effected by allowing cars to reach their billed destinations and rebilling from such points to correct destinations, resulting in delays and assessment of combination of local rates. Loading of some government orders requires accumulation of tank cars over periods of a few days because of lack of permanent storage facilities for certain critical commodities such as cumene, isobutane, etc.

"There will be frequent instances of bunching of cars due to railroad wrecks, washouts, etc. during which period our refinery will be short of cars and unable to ship certain critical government materials. Cars then will be delivered to us in such quantities that they cannot be loaded within free time, making it necessary for us to release a great many that would otherwise be loaded by us within the next few days. This might possibly result in some speeding up of tank cars, but certainly would play havoc with our refinery operations.

"These are only few of many instances where your order will do more harm than good. We respectfully request therefore that the effective date of this order be postponed and that a conference be called of interested tank car owners and shippers to determine necessary changes to remove injustices and to effect fullest possible speeding up of loading and unloading of tank cars."

One irate refiner said: "This order requires me to pay demurrage on my own cars, standing on my own tracks built on my own refinery property. Where is the sense in that?"

N.G.A.A. Protests

A protest from Natural Gasoline Association of America says:

"Production of natural gasoline and liquefied petroleum gases is governed largely by variation in weather, proration orders and changes in plant operations to comply with government orders for essential and critical products. Most plants are small and located miles from sidings and loading on isolated spurs also several miles from the nearest billing freight agent. Many have only tri-weekly switching service and loading schedules are unpredictable. Company traffic men must have flexibility in control of empty tank-car supply to various plants and be able to divert cars in transit if all plants to be served are to be supplied with suitable cars and only

the number of cars required or the number which can be most expeditiously handled. Without this privilege and with limited storage, plants will frequently be forced to shut down and materials needed by manufacturers of high-octane aviation fuels, synthetic rubber and other vital war products will be lost.

"The only conclusion to be drawn from these facts is that the abolition of the privilege of reconsignment and diversion of tank cars stipulated in your order will result in much unnecessary additional movement of empty tank cars and will reduce rather than increase their effective movement, thus defeating the purpose of your order.

"We also protest the inconsistency of the order in not providing relief for carrier inability to refrain from bunching cars in transit and inability to provide daily service not excepting Sundays and holidays. The stringency and lack of flexibility of the order will result in reswitching of cars at loading racks to spot cars in the order in which they were received, thus unnecessarily increasing car detention and requiring additional switching service by the already overburdened railroads.

"It is our considered opinion that the rates, rules and regulations contained in S. O. 263 are unreasonable and in violation of Section 1 of the ICC act. We therefore reiterate our request for a suspension or postponement of the effective date of the order pending an investigation and hearing."

Record Gas Operations Reported

OPERATING at high efficiency within the limits of governmental restrictions, the gas utility industry during 1944 established new records in the number of customers served and the volume of gas fuel delivered to wartime plants and to homes and commercial establishments.

At the end of 1944, 19,775,000 customers, the largest number ever connected to the mains of the industry, were being served with gas. This was an increase of 2 per cent over the year 1943. Of this total, manufactured and mixed gas companies were serving 10,634,000 customers while 9,141,000 were served by natural-gas companies.

Natural-gas companies grossed $682,738,000, a gain of 6.1 per cent. Industrial and commercial sales of natural gas increased by 52,664,000,000 cu. ft. during the year, bringing total sales for 1944 to 1,182,544,000,000 cu. ft. This was a percentage increase of 4.7.

In the household uses of gas, such as cooking, refrigeration, house heating, water heating, etc., manufactured and mixed gas companies sold 306,765,000,000 cu. ft., a gain of 4.5 per cent. Gas consumed for house heating increased approximately 1.2 per cent. Sales of natural gas for domestic uses were 567,417,000,000 cu. ft., an increase of 10.6 per cent.

Indications are that the marketed production of natural gas in 1944, including amounts used in the manufacture of carbon black and for field purposes, will reach approximately 3¾ trillion cubic feet.

During the year the natural-gas industry met ever-increasing demands with a minimum use of men and materials.

The gas line from Texas to West Virginia (of the Tennessee Gas & Transmission Co.) started operating in October and is delivering more than 200 million cubic feet of gas per day into the highly industrialized area in the Appalachian region, relieving a threatened gas shortage in that area.

A pipe line is being projected from Texas to California to supplement the natural-gas supply to that state. A line in excess of 24 in. in diameter and 1,000 miles long is contemplated for construction in 1945. Many looping projects have been constructed during the year to increase transmission facilities and augment the supply.

Small Jobs Important, Too

The magnitude of operations for war is so great today that it is natural to look first at those applications of gas which are, in themselves, large and striking. However, it is not only the big jobs which demand attention, but the many small ones as well, particularly when they lead to improvements in process or quality or permit reductions in cost of manufacture or accelerate speed of production.

To cite an example, equipment competitive to the gas industry produced excellent results in speedier heat treatment of various items such as shell noses, gears, etc., and this led to a research program which has now culminated in the direction of high-speed gas heating units that not only duplicate but exceed the performance previously reported in these important fields.

Heating parts undergoing treatment by means of hot air up to 1,000° F. in so-called "convection" furnaces have been common practice in the past, but today this field has been extended to temperatures as high as 1,750° F. This represents heats which formerly were thought to be the exclusive field of radiant heat transfer, but the great strides made in metals which can withstand high temperatures make possible the extension of air heaters.

Shutt Elected Vice President Of Barnsdall Oil Co.

The election of R. E. Shutt as vice president of Barnsdall Oil Co. in charge of exploration in the Mid-Continent area was announced Monday by D. R. Snow, vice president and general manager of the company. Shutt recently resigned from a similar position with Shell Oil Co., Inc., with which company he was connected for a period of 21 years.

At the annual meeting of Barnsdall company January 4, stockholders were informed regarding plans to carry on operations in Venezuela. As a partner with Sohio Oil Co. (Standard of Ohio) the company has approximately 420,000 acres under lease in Venezuela. The companies plan to start an exploratory and development program this year.

RFC Reports on Petroleum Expenditures

WASHINGTON.—Year-end financial statements of the Reconstruction Finance Corp. and its subsidiaries include the following data:

Defense Supplies Corp. has spent $2,976,000,000 for purchase of aviation gasoline for resale to Army and Navy from start of program to December 31, 1944.

A total of $190,400,000 in loans and advances has been disbursed by DSC in connection with construction of facilities for production of 100-octane gasoline, and repayments have aggregated $84,400,000.

Subsidy payments on production of crude oil from stripper wells between August 1 and December 31 totaled $11,300,000, but all claims have not yet been paid.

Payments of extraordinary transportation costs on petroleum to the eastern seaboard total $297,400,000, and on crude from Texas and Louisiana to midwestern refineries total $4,000,000.

In operating government-owned oil pipe lines, DSC has spent $438,200,000 for purchase of crude and products and operating costs, and receipts from pipe-line operations total $505,700,000.

Defense Plant Corp. as of December 31 had spent or made commitments of $715,000,000 for 57 synthetic rubber plants; $245,000,000 for 38 aviation gasoline facilities; and $189,000,000 for six pipe lines.

THIS WEEK

PRICES—National industry advisory committee meeting January 15 to organize study of producing costs. . . . Prospects not overly bright for general advance. . . . OPA, OES and OWM expected to argue that subsidy relieves all high-cost operations. . . . ¶House subcommittee on petroleum recommends further incentives for crude-oil discoveries—there rests the chief hope for general price advance. . . .

TRANSPORTATION—Refiners and natural-gasoline manufacturers lodge vigorous protests against ICC Order 263 which institutes stiff tank-car demurrage charges. . . . Reconsideration asked before order becomes effective January 15. . . . Military calls on refiners forces accumulation of cars to meet shipping instructions on short notice. . . . ¶Tightening steel situation threatens deferment of some new pipe-line projects. . . . ¶Maritime Commission contracts for 60 new tankers, mostly for 1945 delivery. . . . ¶Survey shows 50,761 tank cars in East Coast petroleum service. . . .

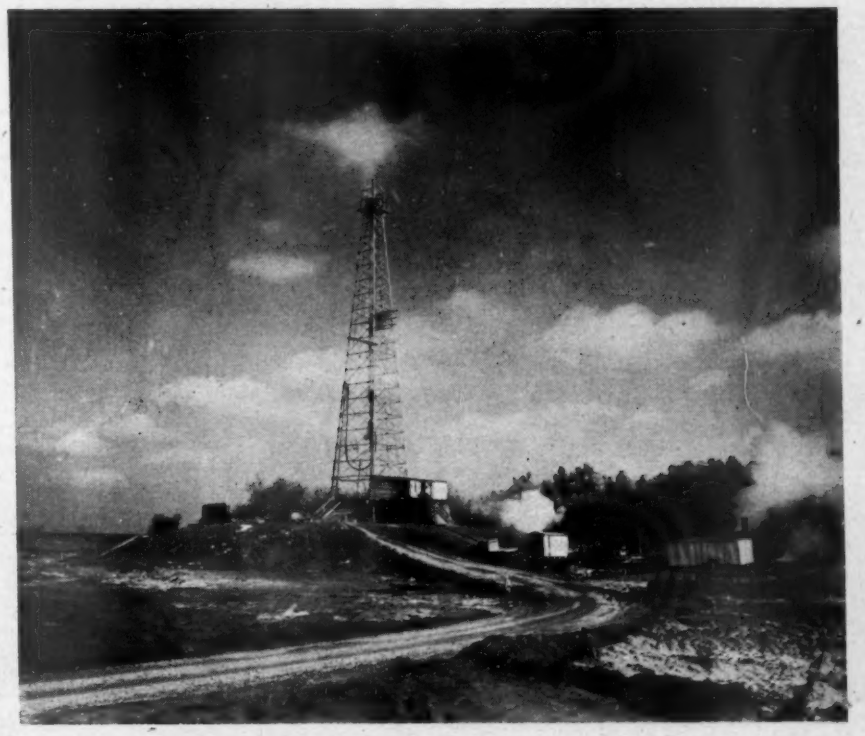
PRODUCTION—Nation's output running 40,000 to 50,000 bbl. per day behind PAW quota for January. . . . Increases in Texas, California and Illinois fail to offset slumps in Kansas and Mississippi. . . . ¶Three wildcat discoveries in East Texas, one in West Texas, completed and placed on regular production. . . . Severe blizzard hampers eastern field operations. . . .

SUPPLIES—Late-winter pinch in domestic heating oils threatened. . . . ¶Refiners shifting all possible emphasis to lighter crudes to correct for top-heavy stocks of residual fuels. . . . ¶Another increase in percentage of gasoline yield expected in Middle West. . . . Interior refiners face call for larger contribution to all-purpose military gasoline supply. . . .

DRILLING—Completions shrink to 416 for most recent week, continuing year-end slump. . . . ¶Cumulative shortage of rig-maintenance parts may be retarding factor. . . . ¶Congressional report recommends release of experienced oil-field workers as soon as military services can spare them. . . . ¶Efficiency of currently active rigs remains static at 55 to 60 per cent of normal. . . . ¶Drastic correctives may be necessary—if industry comes near the 27,000-well goal—and, it must to maintain production. . . .

NATURAL GAS—Federal Power Commission asserts it has no intention of infringing on state conservation authority. . . . Statement from Chairman Manley indicates FPC will confine investigation to interstate aspects of conservation. . . . ¶M. W. Kellogg Co. announces commercial process for synthesizing natural gas to gasoline—at a cost of 5 cents per gallon. . . . Development spurs interest in Fischer-Tropsch process for maximum utilization of natural-gas resources. . . .

INTERNATIONAL—Discussions of revised Anglo-American oil agreement subside pending next week's meeting of Petroleum Industry War Council. . . . State Department prepared to make specific suggestions on changes in language. . . . ¶House group proposes modification of regulations to expedite export of petroleum drilling, refining and transportation equipment. . . .



Because of seasonal flood overflows which inundate the normally dry ground surface to depths of 15 to 16 ft., wells located on the river side of the Mississippi levee in the Lake St. John field, Concordia Parish, Louisiana, operated by the California Co., are being drilled on top of artificial earthen mounds. Elevation of the mounds is approximately 17 ft. above normal. Each covers an area 75 ft. long and 60 ft. wide with a side slope of 4 ft. to 1 ft., and required the moving of approximately 15,000 cu. yd. of dirt. Sides will be sodded to prevent erosion. Three locations are involved and drilling is being hurried to complete the wells before the coming spring floods. During high water the mounds will be islands, accessible only by boat

Fischer-Tropsch Commercial Process Announced by Kellogg

by Arch L. Foster

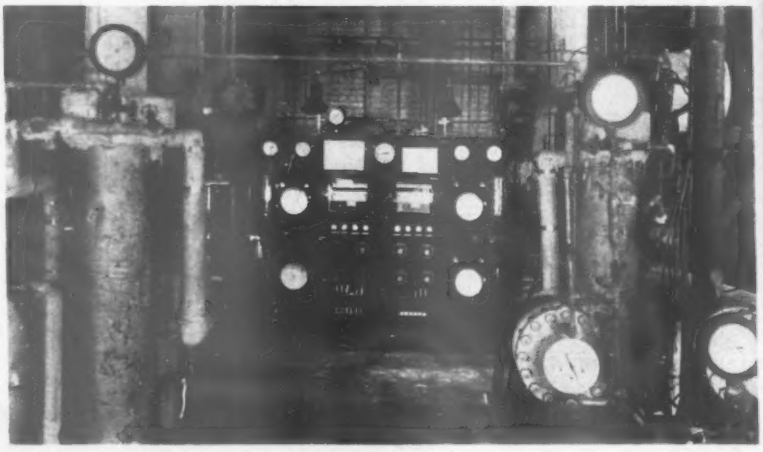
A NEW commercial process whereby motor fuels and other hydrocarbon products of the petroleum range are synthesized by the Fischer-Tropsch synthesis has been announced by M. W. Kellogg Co., engineers and builders of refinery installations. According to statements made this process enables the refiner to produce motor fuel from natural gas of 75 A.S.T.M. octane number, clear—that is, without addition of Ethyl fluid—or Research octane number of 83. This product may be made at a price of 5 cents per gallon, based on 5 cents per 1,000 cu. ft. of gas, and a plant depreciation rate of 10 per cent per annum.

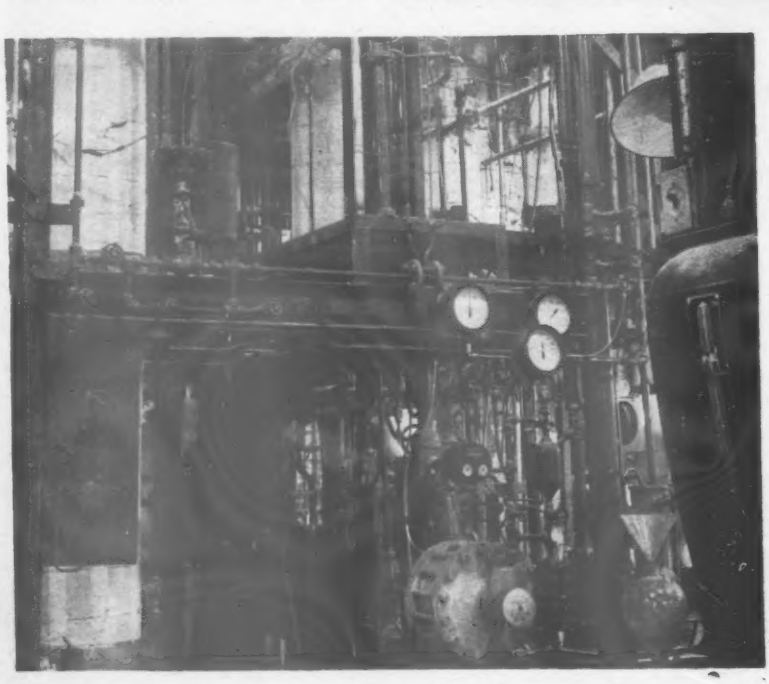
Kellogg is prepared to build refining units employing this process for the refining industry, the announcement states.

During recent years a half dozen or more laboratories or groups of laboratories have been delving into the mysteries of the Fischer-Tropsch synthesis, and this appears to be the first announcement of a successful commercial process resulting from these efforts. Basically the process as applied to natural gas partially oxidizes natural-gas hydrocarbons such as methane to carbon monoxide, CO, and hydrogen, H_2, forming a mixture of these gases. This step and the succeeding one are catalytically promoted. The mixture of CO and H_2, in definite proportions such as 1 CO to 2 H_2, is led into the presence of a catalyst, such as iron, cobalt, nickel, etc., at elevated temperatures, and the constituents recombine to form hydrocarbons of different molecular weights, simulating more or less a typical petroleum mixture.

With catalysts such as cobalt or nickel a product is formed in which normal paraffins predominate up to and including heavy paraffin waxes. This is the earlier synthesis by which these products such as high cetane number diesel fuels are synthesized, solid paraffin wax, etc. More recently other catalysts, such as sintered iron, have been introduced and the result is a product of a mixture of varying molecular weight hydrocarbons in which isoparaffins and even naphthenic and aromatic mixtures are the main constituents. Kellogg states that the motor fuel referred to—75 A.S.T.M. octane number, clear—is "leaded" to 80 A.S.T.M. or 89 Research with 1 cc. of tetraethyl lead, suitable for competitive housebrand motor fuel in the postwar period.

Yields of up to 80 per cent of the theoretical from natural gas are obtained, Kellogg states, which compare more than favorably with reported European yields of 30-40 per cent of product of around 25-octane number or about the rating of normal hexane. So far as is known European practice up to the outbreak of war centered mainly in Germany; developments in that country since 1939 are unknown. Supplementing research work in this country, a group of Kellogg and other engineers went to Europe in the late 1930's to study operations of this process.





Above: Control board and some of the early equipment used in carrying out the synthesis step. Left: View of the pilot-plant equipment for hydrocarbon synthesis and recovery

Interest Increasing

Most attention has been to natural gas in this country as raw material charge for the Fischer-Tropsch synthesis, and to development of catalysts and methods whereby isoparaffins and other high

antiknock constituents are produced in large percentages. One of the major difficulties to be overcome has been control of temperature in this second reaction which is exothermic, that is, it gives off heat during the reaction. Temperature of reaction governs closely the nature of the product made, and at a temperature of about 400° C. (752° F.) the product is mainly methane, the chief constituent of the raw material. At lower temperatures heavier molecules are formed, and the range and percentages of different individual hydrocarbons formed can be varied over wide limits. Kellogg states that its laboratory has developed satisfactory means for control of temperature. Thus, the quality and composition of the synthesized product has been developed to commercial standards.

While the attention of the industry at present is toward use of natural gas as long as a plentiful supply is available this process may be utilized with any high-carbon stock such as refinery gases, coal or even lignite. Brown coal (a type of lignite) and hydrocarbon tars are used in Germany, it is understood, as charge stocks to Fischer-Tropsch units.

Carter Oil Announces Several Promotions and Transfers

W A. WATKINS, formerly superintendent of the southern division of The Carter Oil Co., with headquarters in Shreveport, has been promoted to general superintendent of production, with offices in Tulsa. His advancement is part of a series of changes announced by Carter. Watkins succeeds Ralph E. Damp, who is going to Havana, Cuba, as director of Standard Oil Co. of Cuba, in charge of drilling and exploration.

Other changes announced by O. C. Schorp, president, include appointment of F. W. Bruner, formerly acting division manager of the Northwest division with headquarters at Billings, Montana, as manager of the southern division, succeeding Watkins, in Shreveport.

Curran New Division Manager

R. B. Curran, formerly assistant division manager of the northwest division, with headquarters at Billings, Montana, becomes division manager. John Campbell, formerly assistant supervisor of petroleum transportation, becomes special assistant to M. A. Wright, assistant manager of Carter's production department, in Tulsa. Phil Cochran, formerly division geologist of the southern division, becomes assistant superintendent of that division, and R. W. Beck, assistant division geologist at Shreveport, has been named division geologist.

Sequoyah Brown, assistant manager of Carter personnel and industrial relations department, has resigned to become head of a similar department in the newly organized Interstate Oil Pipe Line Co.

H. R. Shannon, Powell, Wyo., who was district superintendent of the Elk Basin properties, is elevated to production superintendent of the northwest division, with headquarters at Billings. W. D. Maxwell, Elk Basin production foreman, will succeed Shannon as district superintendent at Powell.

Carter announced that tentative appointments of six officials in the Illinois fields have been made permanent. They are: R. J. Sullivan, eastern division superintendent, with headquarters at Mattoon; O. D. Harper, assistant division superintendent; J. D. Gustafson, division engineer; T. K. Whittington and C. H. Lindsay, superintendents of the Dix and St. Elmo districts, respectively; and R. E. Hammond, district engineer at St. Elmo.

W. A. WATKINS

RALPH E. DAMP

R. B. CURRAN

P. K. COCHRAN

Three Promising Oil Areas In Mexico to Be Explored

MEXICO CITY.—Three areas in Mexico offer prospects of oil production and will be subjected to thorough exploratory work, according to a statement of Petroleos Mexicanos, the government-controlled oil monopoly, summing up its activities in 1944.

These areas, Pemex said, are in the states of Guerrero, Lower California and Puebla. In addition it is planned to drill 26 wildcats in an area along the United States-Mexico border, 13 in Tampico and 10 in the Isthmus of Tehuantepec.

The statement notes that production of crude oil, curtailed by contraction of means of transportation because of war conditions, was 36,120,000 bbl., compared with 33,795,000 in 1943. Proceeds from domestic sales of refined oil totaled 337,687,000 pesos, compared with 292,000,000 pesos in 1943. In addition, 53,149,000 pesos were derived from export of 4,867,000 bbl.

Taxes paid to the federal and state governments amounted to 105,888,000 pesos. The company announced that it would publish its budget for 1944 "so that the public may know the economic situation of this industry" as soon as the proposal is approved by President Manuel Avila Camacho.

PAW Announces Spacing Rules in Two Fields

WASHINGTON.—Operators in the Shriver field, Pratt County, and the Barry field, Rooks County, Kansas, have been granted optional spacing patterns by Petroleum Administration for War.

In the Shriver field such authorization is granted provided (1) that each well is located within 30 ft. of the center of the northeast quarter of a quarter-quarter section or within 30 ft. of the center of the southwest quarter of a quarter-quarter section, and (2) that each well is drilled in conformity with the provisions of paragraphs (f) (1) (i) and (f) (1) (ii) of Petroleum Administration Order 11.

In the Barry field such authorization is granted provided (1) that each well is located within 30 ft. of the center of the northeast quarter of a quarter-quarter section or within 30 ft. of the center of the southwest quarter of a quarter-quarter section; (2) that each well is drilled on a drilling unit consisting of ½ of a quarter-quarter section upon which no other drilling or producible well is located, and (3) that each well is drilled in conformity with the provisions of paragraphs (f) (3) and (f) (4) of PAO 11.

WLB Establishes Approvable Wage Rates for Rig Builders

Board Acts on Recommendation of Tripartite Council; Action Is Effective in 27 States

WARTIME scarcity of labor and military demand for petroleum products created pressure early in the war which tended to push wages in the oil industry—as in others—upward toward inflationary levels. To keep the nation's economy in balance, stabilizing controls on prices and wages were necessary.

As a part of this program, the War Labor Board established approvable rates for rig builders in the petroleum industry in 27 states. In setting up these rig-builders rates, up to which pay levels might be raised with WLB approval, the board acted on the recommendation of a tripartite panel which had studied the problem of wage rates for the workers. The request for a uniformity of rates in the petroleum industry was originally made by the Petroleum Administration for War.

Prior to the establishment of uniform rates throughout the area, differentials as high as 50 cents an hour for the same classification of work existed among different areas. The new rates set up by WLB maintain the traditional differentials among the three classifications of labor but abolish the area differentials for similar work.

The following minimum approvable hourly rates were established by the board:

Rig-building foreman (crew pusher), $2.75; rig builder, $2.50; rig-builder helper (apprentice), starting rate, $1.50.

These approvable rates are not automatic or mandatory and require approval of the regional WLB in the area involved. The rig-building rates mentioned apply to the workers in the petroleum industry in the following states:

Alabama, Arkansas, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa.

Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska.

New Mexico, North Dakota, Oklahoma, South Dakota, Tennessee, Texas, Utah, Wisconsin, Wyoming.

Under ordinary circumstances, an establishment employing eight or fewer workers, except in certain specified industries, may make increases without WLB approval. However, this does not apply to employers in the rig-building branch of the petroleum industry in the areas mentioned above. All wage adjustments in those areas must receive the approval of the board.

Conditions of Wage Boost

Under existing wage controls, WLB may approve wage increases under the following circumstances:

1. General wage increases related to the cost of living and limited to the 15 per cent under the Little Steel formula.

2. Increase to correct inequities in rates for similar work in different plants, which may be brought up to the minimum of sound and tested rates being paid for a particular job in an area.

3. In rare and unusual cases affecting prosecution of the war, the board may grant increases above the minimum of sound and tested rates. Such increases are rarely granted and a showing must be made that critical war production cannot otherwise be obtained.

4. The board may approve increases to correct gross inequities in the wage structure of a single plant; but these increases must not be the basis for increased prices and must not appreciably increase the level of production costs.

WLB may approve other increases, such as sick-leave plans and overtime pay for time worked after 40 hours a week if it is not already being paid in compliance with the Fair Labor Standards Act. The board generally has approved 1 week's vacation after service of a year or more, and 2 weeks vacation after 5 years' service.

Customarily bonuses may be given without board approval if the amount is not greater than that given last year, or, where figured on a percentage basis, if the method of computation is not changed. Any other type of bonus would have to receive board approval, although recently the board announced that employers may grant year-end bonuses up to $25 to their employes without further approval.

Firms with established incentive plans may continue these plans. An established plan is one which was in effect prior to October 3, 1942. A new incentive plan, or a change in the established plan, would require board approval.

Premium pay for the swing or graveyard shift may also be approved if it is the industry and area practice.

Increases which may be granted without WLB approval include:

Individual increases for merit and length of service within established rate ranges may be given without board approval. If the employer does not have established rate ranges for his various job classifications, he may secure approval by application to the board. The individual increases within the rate ranges cannot exceed 10 cents per straight-time hour or two-thirds of the range for any one employe during the year, and the total amount expended cannot exceed an average of 5 cents per straight-time hour for all employes in the establishment whose rates are under WLB jurisdiction.

Firms with 30 or fewer employes, even without such a schedule, may give individual raises without board approval. However, the "5 and 10" limitation prevails here also, so that increases to individuals must be limited to 10 cents an hour per year and the average increase must not exceed 5 cents an hour.

Limitations in Rate

The new rate must not exceed the highest rate paid for the job classification between July 1, 1942 and July 1, 1943. In addition, the increases must not be a basis for increasing the prices of the product manufactured and must not be contrary to any collective bargaining agreement.

Approval is not necessary for increases incidental to promotion to a job requiring greater skill and greater responsibility. Nor is approval needed to bring wages up to 50 cents an hour.

Pay increases not under the jurisdiction of WLB are:

1. Employes receiving more than $5,000 a year or in supervisory capacities who are not represented by a union. These require Treasury Department approval.

2. In an establishment employing eight or fewer workers, except in certain specified industries, unless the employes are covered by a master bargaining agreement.

3. To equalize rates paid women performing the same work as male employes at the same plant.

4. To meet requirements of federal laws when a firm has a government contract, and to comply with state minimum laws up to 50 cents an hour.

FOUNDED IN 1910

BY PATRICK C. BOYLE

The OIL AND GAS JOURNAL

Our Patent System

IT is certain that the proponents of socialized industry in the session of Congress which has just started will again attempt to further their ends with legislation nullifying or circumscribing the effectiveness of our patent system. In the last session they supported the Kilgore bill, which, with the immediate excuse of a national crisis, sought to bring scientific and technical discoveries of the future under direct government control.

It seems impossible that such a program, in the light of the war's production developments, could be seriously considered by lawmakers. But it will be and should a full-scale conflict continue throughout the year, the pressure for legislative action, coming from groups which are attempting to use emergency conditions as stepping stones in the establishment of a new economic order, will be intensified.

The protection which this country from its beginnings has given the inventor has played a major part in its steady and unparalleled industrial growth. This fact has been brought out clearly in recent analyses made by men of science and industry and supported by leading economists. The encouragement of discovery in technology through patent rights is and has always been the core of our industrial leadership.

If any further proof of the fundamental soundness of our patent policies is needed, the war has supplied that need. Because of what invention has done in initiating and perfecting industrial practices we were able to start the production of essential war materials and equipment in high gear.

Furthermore, there was a large backlog of discoveries which had little or no application during peace but which are vital in war. Aviation fuels and components of synthetic rubber and explosives from within the petroleum industry are examples of this all-important fact. In every instance the impetus of invention over a period of years was responsible for the "know how" of war output.

The war has demonstrated again that in time of national stress industry will drop its individualized operations and through a pooling of activities provide the technicians and manpower.

Patent issues go deeper than the initial devices, the owners of which are given protection in the form of rights. All discoveries ultimately must pass economic as well as technical tests. That is where management becomes important.

Our inventors are fortunate in that those who have the responsibility of direction and final decisions are always looking for something that will do the industrial job better. They are willing to make large outlays in research and development to round out individual discoveries and then follow through with still greater investments in operating facilities. Competitive enterprise is built on the foundation of new methods from which have come improved products at lower prices.

Executives and technicians within and outside the oil industry over the past year have suggested minor revisions in our patent procedure which will meet present and future industrial requirements. Their suggestions will preserve the fundamental principle of the inventor's ownership of that which he originates and at the same time will assure all industry continued freedom of action in the greatest possible development of these discoveries for the common good.

Wilson Cites Dangers of Too Liberal an Importation Policy

IF we let imports come in too freely, we will not hunt for oil here," declares Robert E. Wilson, chairman of the board, Standard Oil Co. (Indiana) and former president of Pan American Petroleum & Transport Co., in an article, "The Future of Our Oil Supplies Assured by Technology," published in the January issue of Mining and Metallurgy.

"Private industry will never go aggressively into the development of oil from shales and coal as long as crude prices remain around the present levels. It seems to me the sound thing to do would be to keep enough oil coming in so that there will be no lack of transportation or legitimate industry, but not so much as to prevent domestic crude prices from being high enough to keep our geologists and drillers hunting for oil and our chemical engineers interested in developing substitute sources."

Wilson cautions against thinking too much about the huge reserves of natural gas in this country, warning that much of it is already earmarked for public utility use and should be considered only as an "ace in the hole." But he reminds his readers that a country with only about 15 per cent of the land area favorable for oil accumulation, and only about 30 per cent of the known reserves, cannot expect to produce indefinitely 65 per cent of the world's oil. "We must look more and more to foreign sources for oil."

"The really rich areas in oil, as proven by drilling," declares Wilson, "are in the large basins alternately lifted and depressed between major continents — the Caribbean area, including our Gulf Coast, Venezuela, and Colombia; the great area between Europe and Asia, which has the tremendous reserves of Arabia and Iran; the intercontinental area of the Netherlands Indies between the continents of Australia and Asia; and finally the area around the Arctic Ocean, in northern Russia and around Alaska, which may prove a rich area, but which, because of physical difficulties, has not as yet been explored."

Commenting on the petroleum wealth of Arabia, Wilson says: "One of the most startling facts about this field is that a total of 160 wildcat wells drilled have proven up reserves about as great as the entire present proven reserves of the United States — 20,000,000,000 bbl. (As a wild guess, it probably took something like 50,000 wildcat wells to find ours.) But it indicates that the Middle Eastern fields are incomparably richer than those in this country."

Wilson points out that this oil must obviously come out into the world market and he looks to the intelligence of oil men and governments to work out an international agreement which will work.

The most imminent danger to the industry, says Wilson, is in the threatening attitude of theorists and faddists against the patent system. "I can think of no more effective way to supersabotage America's future than to destroy our patent system. If we permit impractical theorists and faddists to hypnotize our nation into this act of national harakiri all of us will suffer and no adequate punishment can be meted out to those really responsible. Both the hope of and the danger to America lie in the field of the mind, rather than matter. The only thing that can prevent our country from having abundant liquid fuel for many generations at reasonable prices, certainly much lower than those which prevailed 25 years ago, is interference with the free play of technology and competitive enterprise."

Role of Technology

"Technology," he says, "has made it possible to produce all essential oil products — that is, lubricating oils, gasoline, heating oils, and wax —from coal at costs which are not unreasonable or out of line with values. So when people say plenty of oil is in sight for 1,000 years, what they mean is, if we do not find the oil, we can make it from coal and we have enough coal for that purpose. We do not need to worry about the economy running down or the automobile industry petering out, or anything of that kind. Technology has come to the rescue.

"Technology has made it possible for us to convert heavy fuel oil into gasoline and other oil products. As a consequence, I think we are approaching the time when it will not be considered desirable, or prices will not permit, the burning of fuel oil in direct price competition with coal in large powdered-coal installations. I expect that over a period of time a decrease of something like 15 per cent will be seen in the yield of heavy fuel oil from crude, because heavy fuel oil is now too valuable for making gasoline."

"The newest technological star on the horizon," says Wilson, "is a process being worked out by the Bureau of Mines which gasifies subbituminous coal or lignite, which can be mined by strip mining. These products can be converted to carbon monoxide and hydrogen and thence into gasoline. Probable gasoline costs after another 5 years of technical development will be only 5 cents above present prices.

"Finally, there is coal in unquestioned quantity. Its hydrogenation has been much publicized. It is an expensive high-pressure process, but feasible, and has undoubtedly been a substantial source of Germany's gasoline, and still is, except for those plants destroyed by our bombers."

Wilson tells how by the use of the water drive operators get 60 to 70 per cent of the oil out of the sands, where formerly they recovered about 20 per cent. "In the old days," he says, "we took out only that portion of the oil that came easily under its own head or that could be readily pumped out. As oil becomes more valuable and technology becomes more improved the percentage recovery will go up. One of the reasons that our reserves keep going up is that we are getting more out of the old fields by better and better technology."

Special I.P.A.A. Meeting To Study Oil Problems

The executive committee and state vice presidents of Independent Petroleum Association of America will meet at the Biltmore Hotel, Oklahoma City, January 29 and 30, Ralph T. Zook, president, announces.

"The need for this meeting is urgent in view of many recent developments pertaining to the domestic oil industry," Zook said in issuing the call. "Two full days will be necessary."

Important questions to be discussed include developments in the crude price situation, revisions in the Anglo-American petroleum agreement, proposals of the National Planning Association regarding imports of oil, and problems of the domestic oil industry to be laid before the new Congress.

Purchasing Agents to View Film on Welding

A moving picture on "Welding Line Pipe the Smith Way" will be presented at the January 23 evening meeting of the Mid-Continent Purchasing Agents Association, Tulsa Club Building, Tulsa. Those in the industry who are interested in advances in welding technique are invited. The film was prepared by the A. O. Smith Co.

Combination Stations and Stores Seen for Postwar Merchandising

by N. O. Fanning

NEW YORK.—A survey of postwar gasoline retail marketing plans indicates that eventually the gasoline station operating as part of a store, may replace the present station which deals exclusively in gasoline and lubricating oil and servicing cars.

The store may deal in a variety of merchandise, such as automobile accessories, groceries and other lines having no connection with the automobile industry but serving the needs of the average motorist, besides servicing his car.

At least one major petroleum company has been considering plans for operation of service stations and stores of this type involving a substantial expenditure for new superstations of original design, jointly with a company engaged in selling food products at retail.

This trend, starting before the war, was fostered by organizations not previously engaged in gasoline retailing, rather than by oil companies. There are a large number of these superstations in operation today and they are reported to have proved successful on the average.

The war has eliminated between 50,000 and 100,000 gasoline service stations, and forced the retail gasoline industry to economize drastically. The idea of combining the gasoline service station with store retailing other merchandise fits with this trend.

Postwar Expansion Seen

Signs point to expansion of retail outlets soon after the war, and it is reported oil companies have been acquiring favorable new sites in anticipation of such expansion. However, the industry is likely to avoid multiplication of the common type of service station, which often proved costly and uneconomic during the 30's and resulted in contraction later. The oil companies appear to be more interested now in developing sales along new lines, calling for larger units but fewer in number.

Possibilities for expansion of civilian sales of aviation gasoline and lubricants after the war provide interesting phases of postwar planning in the field of gasoline marketing. There has been keen competition among leading petroleum marketing organizations for contracts to supply existing airports. However, postwar expansion is expected to result in the construction of many new airports, and the transfer of numerous military airports to civilian control.

An example of such a transfer occurred recently in a New York City suburban area, where bids were asked for the operation of an airport designed for military purposes but never used. Several oil-marketing companies submitted bids and the field was awarded to North American Airport Corp., an affiliate of Gulf Oil Corp.

Terms of the Gulf Oil bid provided for minimum quarterly payments under a concession to operate the airport, of $480,000 and 7½ per cent of the gross income for the period of North American's operation of the airport. In addition the agreement calls for payment by North American of $833,400, for permanent buildings and hangars, which revert to the owner on expiration of the contract, which is for the duration of the war plus 15 years. Most of the expenditures are to take place in the postwar period.

Aviation Market Looming

While this case of an airport becoming available during the war is unusual, it clearly points to the interest taken by leading oil marketing companies in postwar civilian aviation sales. Surveys by oil companies, aviation manufacturers and others point to an extensive civilian market for airplanes within 5 years after the end of the war.

Formulation of plans by which oil companies can participate to advantage in aviation sales has been under way for some time, and there has been competition for business of the commercial air lines, but the civilian market is something new, and with the expected widespread construction of new airports it is believed many innovations in the handling of gasoline sales and equipment used will materialize.

The federal Government is reported to be considering substantial expenditures for new airports as part of its postwar program, but much of the new construction will probably fall to private interests. It is expected that both the oil and airplane companies will take a prominent part in such expansion, directly or indirectly, as surveys indicate that the civilian population is definitely interested in prospects of private ownership and operation of airplanes.

Postwar expansion of retail gasoline marketing is not expected to be a blind rush to build new stations, especially as civilian demand for motor fuel is likely to be restricted for a while by the shortage of automobiles. The oil industry foresees orderly construction of large and improved units, designed to provide both for servicing of cars and marketing of products sought by the average motorist. Thus, it is hoped many of the disadvantages of the prewar overexpansion of service stations with its attendant demoralization of the gasoline markets, may be avoided.

New Oil Company to Supply Eastern Oklahoma, Arkansas

TULSA. — Announcement of expansion of activities of the Petroleum Marketing Corp. and Petroleum Transport Co. has been made by Dan Hunt, Jr., and J. V. Brazier, president and vice president, respectively, of the new companies, headquartered in Tulsa. The company recently purchased 31 service stations in Eastern Oklahoma, from Bareco Oil Co. as the nucleus of the organization's distribution business.

DAN HUNT, JR.

J. V. BRAZIER

Hunt is well known in the Tulsa and Oklahoma area, owning the Hunt Building in Tulsa where the companies will maintain central offices. In addition to the service station division Petroleum Transport Co. operates a bulk plant at Tulsa; six 4,000-gal. tank trucks and a motor van for handling lubricating oils.

Brazier is one of the pioneers in the manufacture of lubricating oils and other products from Mid-Continent crudes. He had been employed by the Bareco company 26½ years. He spent 18 years in refinery operations and has been responsible for many developments in lubricants and for the application of lubricating oils to commercial and industrial uses.

Gas Supply, Interrupted by Storm, Available Again

WASHINGTON.—Following drastic curtailment, imposed in order to maintain service on distribution systems during the recent intense cold and high-velocity winds, the flow of natural gas into essential war-production plants in western New York, Ohio and Pennsylvania has been resumed, Edward Falck, director of the Office of War Utilities of War Production Board, announces.

The danger of complete loss of gas service in more than 30 large war-industry cities has been averted, Falck said. Buffalo, N. Y., and Toledo, Ohio, were the cities most seriously affected, when below-zero temperatures and 40-mile winds doubled the average use of gas for heating purposes in these areas. The Office of War Utilities, by emergency directives, reduced consumption and routed gas into the threatened systems. At the same time appeals were made to residential users to cooperate.

James Replaces Macauley As Director of C.R.C.

NEW YORK. — Cooperative Research Council held its annual meeting on January 3 at which five of the retiring directors were reelected. W. S. James, chief engineer of the Studebaker Corp. and formerly with Tide Water Associated Oil Co., was elected a director to replace J. B. Macauley, Jr., of Pratt & Whitney, who declined reelection.

The council is sponsored jointly by the American Petroleum Institute and the American Society of Automotive Engineers.

The five directors who were reelected are D. P. Barnard, Standard Oil Co. (Indiana); G. H. B. Davis, Standard Oil Development Co.; J. F. M. Taylor, Shell Oil Co., Inc.; B. B. Blackman, Autocar Co., and C. G. A. Rosen, Caterpillar Tractor Co.

Socony-Vacuum to Build Heating-Oil Laboratory

NEW YORK.—A laboratory for testing domestic heating oils will be constructed by the Socony-Vacuum Oil Co., Inc., at 412 Greenpoint Ave., Brooklyn. It is expected to be in operation early in the spring.

The laboratory will be one-story, three-room building and will have the necessary facilities for studying the practical performance of fuel oils in commercial burners. Emphasis will be on adaptation of the new refining processes for the production of fuel oils which will perform economically and satisfactorily in present and postwar burners. The laboratory also will be used by company engineers and salesmen for instruction so that the best service may be given to fuel-oil consumers.

Sinclair Posts Prices in Big Sand Draw Field

Sinclair - Wyoming Oil Co. has posted its prices for Tensleep sand crude in the new Big Sand Draw field of Fremont County, Wyoming, effective December 30, 1944, as follows: Below 29° gravity, 76 cents, with 2-cent differential, beginning at 78 cents for 29° to 29.9° gravity, to a top of $1 for 40° gravity and above.

Lubrication Engineers to Hold National Meeting

CHICAGO.—The recently organized American Society of Lubrication Engineers will hold its first national conference February 8 and 9 in the Stevens Hotel, this city. E. M. Kipp, chairman of the program committee, has arranged for presentation of technical papers by recognized authorities in the field of lubrication. C. E. Pritchard, Republic Steel Corp., is president of the new organization; J. C. Peebles, dean of engineering, Illinois Institute of Technology, vice president; B. H. Jennings, professor of mechanical engineering, Northwestern University, secretary and treasurer. Headquarters are in Chicago.

Contract for Nine Tankers Awarded to Marinship

WASHINGTON.—A contract has been awarded to Marinship Corp. for construction of nine more tankers during the second half of 1945, U. S. Maritime Commission announces. This makes a total of 13 high-speed tankers to be built at Marinship's Sausalito, Calif., yards and delivered in the second half of the year following completion of 27 previously contracted for.

The new ships will be of the 8,250-hp. Hills class, powered by modern turbo-electric propulsion equipment. The Navy oilers are built to a special design for use with the U. S. fleet, requiring nearly twice as much work in construction.

Dr. Giddens to Tell Story Of Oil's Early Years

Dr. Paul H. Giddens, curator of Drake Well Memorial Park and Museum at Titusville and professor of history and political science at Allegheny College, will speak at the Tulsa Club, Tulsa, the afternoon of January 16, on "Beginnings of the Petroleum Industry." The meeting, sponsored by the Kansas-Oklahoma division of Mid-Continent Oil and Gas Association, will be open to all interested. The speaker will be introduced by James A. Veasey, of Ann Arbor, Mich., retired general counsel of The Carter Oil Co. Dr. Giddens will show stereopticon slides made from the famous Mather collection of photographs of scenes in the early oil fields.

DEATHS

Thomas W. McManus, 53, of Bakersfield, Calif., secretary of San Joaquin Valley Oil Producers Association died January 1 in Washington, where he had gone on business for the association. He had been in failing health since receiving notification that his only son, Lt. Thomas W. McManus, Jr., serving in the Army Air Forces, had been lost in action over France shortly before Christmas. The elder man was a veteran of World War 1 and was one of the organizers of the American Legion.

Albert Culbertson, 94, retired oil operator of Knox, Pa., died December 29 at his home in St. Petersburg, Fla.

Lt. E. B. Baldwin, of the U.S. Navy, formerly an independent oil operator of Houston, died January 1 at Pasadena, Calif.

Frank Henderson, 76, oil-well drilling contractor in many oil areas of the United States, Mexico, and the Orient, died December 22 in Grove City, Pa. During World War 1 he spent a year in England drilling water wells for the British Government.

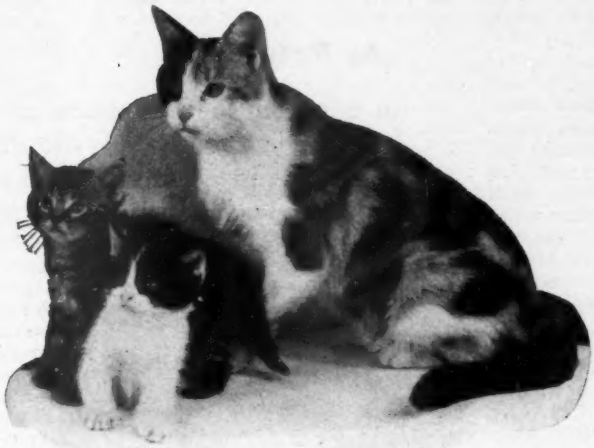
George N. Weber, 36, refinery superintendent for The Derby Oil Co., died December 27 in Wichita, Kans. Weber joined Derby as a chemist in 1931. Promotions to cracking-still foreman and assistant superintendent followed.

Walter H. Girdler, Sr., 58, president of Tube Turns, Inc., and Girdler Corp., was found dead in bed at his home in Louisville January 7. Death apparently had been caused by a heart attack.

W. Jones Turner, 53, chief accountant in the production department of Houston Oil Co. of Texas, died January 4 in Houston.

Albert M. Kelley, 55, vice president of Richfield Oil Corp., in charge of manufacturing, pipe line and marine operations, died January 7 at Los Angeles of a brain hemorrhage.

Cats to Kittens



U. O. P. has designed a 1500 barrel Fluid Catalytic Cracking Unit This efficient "Kitten" unit embodies the technique and experience resulting from many larger U. O. P. Fluid Cat Crackers in successful operation with charging capacities from 2600 to 16,000 barrels

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CATALYTIC REFORMING	DEHYDROGENATION
HYDROGENATION	POLYMERIZATION
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East Pauls Valley Pool Presents Study of Modern Drilling and Completion Practices

by Paul Reed

In this pool there is much coring and drill-stem testing since most wells are drilled like wildcats. Some unique features may be observed in drilling equipment and in application of removable casing

THE East Pauls Valley pool development in Garvin County, Oklahoma, presents an opportunity for observing the application of modern practices for an area where wells are drilled to depths seldom much below 3,100 ft. Because of the unusual and irregular nature of formations it is a general practice there to treat each well as though it is a wildcat. In the drilling of nearly all the wells two to five cores and drill-stem tests are taken.

The average rig drills a well in 15 days. Some rigs, similarly equipped, have demonstrated ability to drill wells in approximately half this time. They are equipped with two 135-hp. compounded engines, operated on butane or natural gas. One of these is operated by Kerlyn Oil Co., contracting for Ohio Oil Co.

A belt-driven rotary is a unique feature of the Kerlyn rig which has attracted much interest because of advantages demonstrated in successful operation. Belting consists of six V-belts transmitting power from the draw works to the rotary table. Experience indicates that the belting slips when the load is greater than it is safe to pull. In 3½ years of operation in various fields there have been only two fishing jobs with this equipment. In this time there have been only two belting installations. The first one was damaged by a faulty guard; the second has been with the rig for over a year. Equipment for the belt drive is inexpensive.

Right: Mast-type rig equipped with emergency trolley to furnish means of escape for the derrickman. Below: Draw works equipped with pulley for driving rotary by V-belt

This rotary belt drive was devised by E. Baxendale, J. R. Glover, and W. L. Golding, drillers for Kerlyn. Baxendale believes that more efficient power transmission is obtained with the belt drive which makes it possible to spin the rotary table approximately a third faster than formerly. Consideration is being given to furnishing rotary belt drive to a new larger type of rotary rig soon to be put in another Oklahoma field.

Drilling Equipment

A majority of the rotary rigs in the area are equipped with modern efficient types of masts which reduce time and expense of moving to locations at distances farther than it is practicable to skid a derrick. These masts are of designs which vary in the degree to which they provide compactness, easy portability, and construction of a kind providing a clear view which makes it possible for the driller to see the derrick man and the crown block. In the drilling of one of the wells in the field, the advantage of providing means for safe escape of the derrick man from his operating post on the racking board was demonstrated when a fire occurred during a drill-stem test. The derrick man slid down to the ground, suspended from a trolley device on a cable. The trolley device had been specially made for the contractor with a brake for controlling the rate of descent.

Drilling and completion procedures are appropriate for existing conditions of East Pauls Valley where several formations are pene-

trated to which special attention is given.

In the drilling of most wells in the pool a thief gas sand is encountered at 2,100 ft.; the thin, limy spotted McKinney gas sand is cored and given a drill-stem test at approximately 2,950 ft. About 35 ft. below the McKinney are the formations in the lower part of the Pennsylvanian where the two principal producing horizons in the pool are located. The upper one, known locally as the Burns, is found at depths between 2,800 and 3,000 ft.; and the Brundidge, usually referred to as the chert conglomerate, including zones from the base of the Burns to the base of the Pennsylvanian, is found at depths of approximately 2,900 to 3,050 ft. The largest operator in the field has a policy of drilling all wells into the Ordovician, at a depth where either the Viola lime or the first and second Bromide sands may be found. But Viola lime and Bromide sand production are not found in the same well. Where one is present the other is absent. Oil of 6° to 11° A.P.I. gravity has been found in six wells in the upper Bromide sand in the East Pauls Valley pool, but it is not produced because of the unmarketable nature of the oil. Results so far in the Simpson have been disappointing. A marker established by drilling to the Ordovician has been of assistance in determining the structural position of upper horizons.

In drilling most wells in the Pauls Valley pool, pipe is set, the rotary equipment is moved off and cable tools are moved in to complete the hole to its final depth. These measures may be taken before drilling the Viola and Bromide formations; in some cases it is reported that they may be taken afterward for the purpose of exploring at a lower depth.

A surface string of 500 to 1,000 ft. of 8⅝ or 10¾-in. casing is set with 300 to 350 sacks of cement. The recent trend has been toward shorter strings of surface pipe. For the oil string the prevailing practice is to run either 7-in. or 5½-in. casing to the point where rotary drilling stops in the Ordovician (this is run with the guide shoe and float collar) and set with 500 to 700 sacks of cement. Temperatures are taken during cementing of nearly all wells for guidance in future operations.

Well Completions

Gun perforating with ½-in. or $\frac{9}{16}$-in. holes is done at selected zones. By shooting three holes per foot present needs are provided for. Additional perforations may be made later.

At a few wells casing has been set on top of the Pennsylvanian producing formation to provide for either immediate or later shooting of sand where productive possibilities appeared to require this.

In the recent completion of Ohio Oil Co. 3 Stanton casing was run for the oil string with a Securaloy window facing the Burns zones. This is the first installation of its kind in the East Pauls Valley pool. Below the Securaloy window, as above, the casing is of steel for the distance of 100 to 150 ft. to the bottom of the hole. During early stages of production the Burns is to be produced through perforations in the usual manner, thus providing for control of flow into the well which would be favorable for maintaining desirable gas-oil ratios. Within a 3-year period the window could be removed by chemicals so as to expose the sand for shooting with nitroglycerin. Removal of windows is now generally done by potassium nitrate and caustic soda in a water solution rather than by milling or drilling out as formerly.

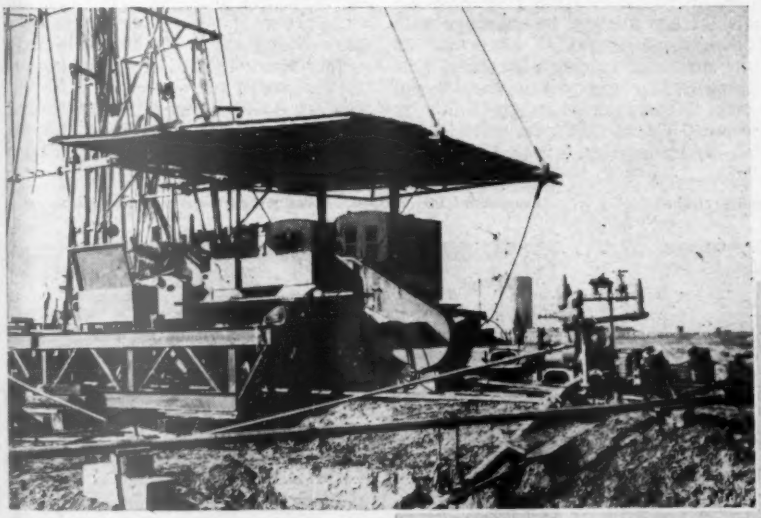
So far there have been few Securaloy casing installations in Oklahoma and Kansas. Most of the applications in the Mid-Continent area have been in Illinois. However, in that area there have been only a few installations for production through perforations, according to the procedure planned for East Pauls Valley. Large perforations of 1½ to 1¾-in. in Securaloy windows are said to have proved to be advantageous.

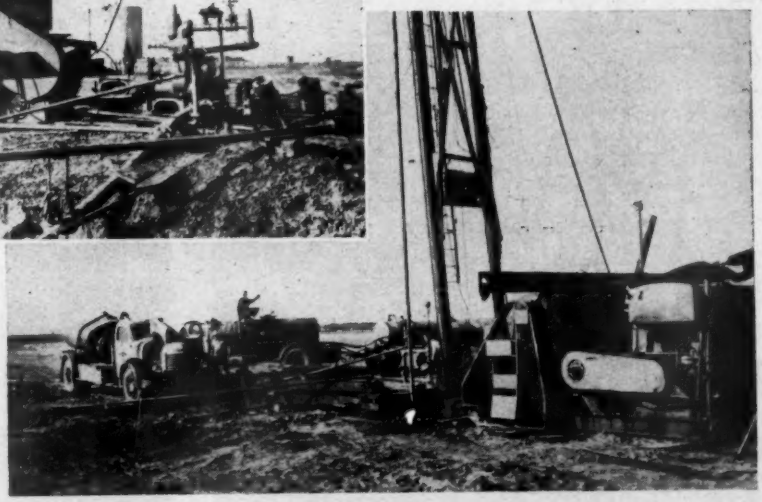
After selected zones have been perforated, their contents are determined by running a casing swab. Following this operation the next procedure may be to reperforate or squeeze whichever proves to be necessary.

(An article entitled, "Multiple Sand Completion Uses Removable Casing," by Harry F. Simons, The Oil and Gas Journal, May 11, 1939, page 49, describes practices in Illinois for using casing with a removable window.)

Acidizing has been done in most

(Continued on page 66)

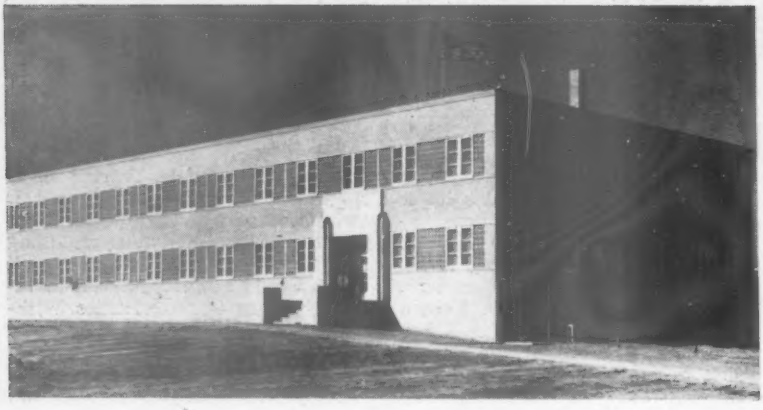




Above: Mechanical rig with portable derrick typical of equipment drilling most of the East Pauls Valley pool wells. Right: Acidizing a well which has been completed with cable tools in the Viola lime after rotary equipment has been removed

Phillips' New Laboratory Represents Latest In Research Equipment

by R. B. Tuttle



Research laboratory of Phillips Petroleum Co., at Phillips, Tex.

FORMALLY opened January 5 for public inspection, Phillips Petroleum Co.'s research laboratory at Phillips, Tex., represents the latest in facilities of their kind. Composed of a main laboratory building, pure hydrocarbon manufacturing and ethyl-blending plants, three pilot plants and auxiliary apparatus, the laboratory unit occupies an area of nearly 15 acres.

The approximately 13,000 sq. ft. of floor space in the main laboratory building is taken up by a GRS synthetic-rubber-testing and chemical-control laboratories on the first floor. On the second floor of the building are located the pilot-plant laboratory, chemical-research and refinery laboratory, along with a conference room, library and various office rooms.

Equipped with semicommercial-scale equipment for the preparation of stock from raw synthetic rubber into samples for testing, the rubber laboratory provides a means for development and product control. Tests carried out in the rubber laboratory are comparable to those for natural rubber except that in most cases tests are made at two different temperatures on the synthetic materials. The temperatures under which the tests are carried out are at room or about 70° F. and at 200°-210° F.

In addition to some eight tests which concern tensile strength, resilience, and other physical properties, three tests relating to the wearing properties, such as abrasion, flexing, and weathering, are carried out in the GRS laboratory. In this particular phase of the testing procedure samples which have been artificially weathered are tested for comparison with unweathered samples from the same sample stock.

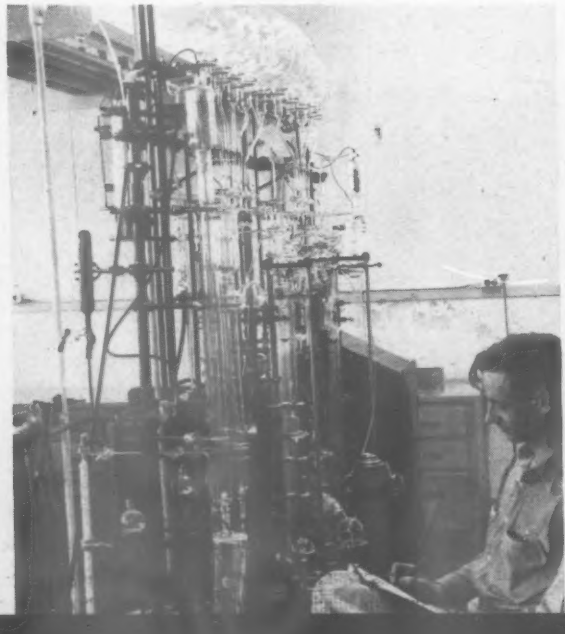
Electrical insulating properties are checked according to standard procedures with special apparatus in the synthetic-rubber laboratory. Test samples are prepared in the laboratory. Measuring 6 in. by 6 in. by about 0.075 in. thick, the samples for all of the tests except that for abrasion are vulcanized with semicommercial-scale equipment according to the specific procedures. Each vulcanized test sample carries an identification symbol or symbols which are placed thereon during the vulcanizing operation. Samples for abrasion tests are vulcanized rings measuring about 3 in. outside by 1½ in. inside diameter and ¾ to 1 in. thickness.

Samples of GRS which are to be weathered are placed into a cabinet where the operation of weathering is carried out at an accelerated rate. Simulated weather conditions are automatically carried out over a maximum to minimum weather temperature range under intermittent rain and sunshine conditions.

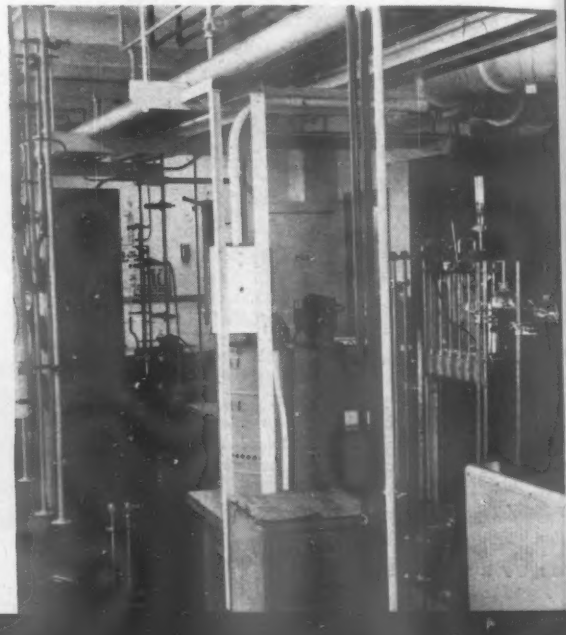
Road tests on tires made of GRS synthetic rubber are being carried out by Phillips with a fleet of 6 trucks on a total of 170 tires. To date over 35,000 miles have been covered by some of the equipment.

Manufactured in the pure hydrocarbon plant are some 11 different materials. Produced in different grades according to purity the individual hydrocarbons range from a

Specialized apparatus used in processing studies



Equipment for studying chemical derivatives from petroleum



Laboratory The Latest Equipment

View of process development laboratory

guaranteed purity of 99 mol per cent for a "pure" grade to 95 plus per cent for a "technical" grade. Certain other hydrocarbons which are designated as a "research" grade are produced to a purity higher than that shown in the "pure" grade.

The commercial manufacture of high-purity hydrocarbons by the Phillips company at its Phillips laboratory is a development of the research department. The equipment used in the production of high-purity materials is built to reduced commercial sizes; for example the largest stills, of which there are three, are equipped with 10-in. diameter by 37-ft.-high fractionating columns. The smallest unit is set up with a packed column which is about 4 in. in diameter. At present there are 11 stills in operation in this part of the laboratory; plans are to increase this number to 12 or more as needed. The stills which operate on batch charges run from 20 to over 1000-gal. capacity and are designed for working pressures as high as 800 p.s.i. Control instruments and other regulating apparatus are commercial items which have been altered as needed to meet service requirements.

The main portion of the synthetic-rubber-polymerization unit is set up with most of the equipment meeting full-sized dimensions of commercial items. Such pressure vessels as are used in the unit are glass lined and the fractionator, piping, and valves and pumps are made of glass. Operated in connection with this plant is a smaller setup which functions as a pilot unit. This unit is slightly larger than the usual laboratory pilot layout.

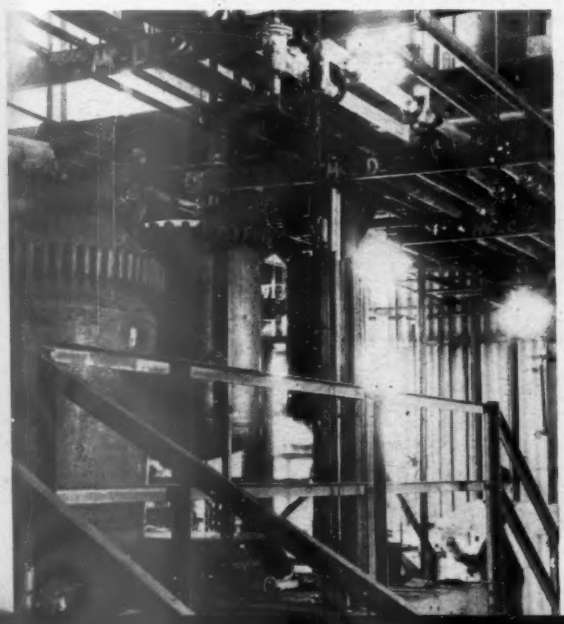
Meeting laboratory requirements for operational accuracy, the TEL blending unit resembles the latter layouts of a commercial installation.

Storage facilities for the laboratory are commercial pressure vessels ranging from 40 or 50-gal. capacity up to 1,000 or so gallons. The aviation-fuel blending system includes pressure tanks with builtin agitators, transfer pumps, and all of the other accessories found in the usual installation but differing in that the vessels are accurately calibrated, and other features necessary for laboratory needs are incorporated in the hookup.

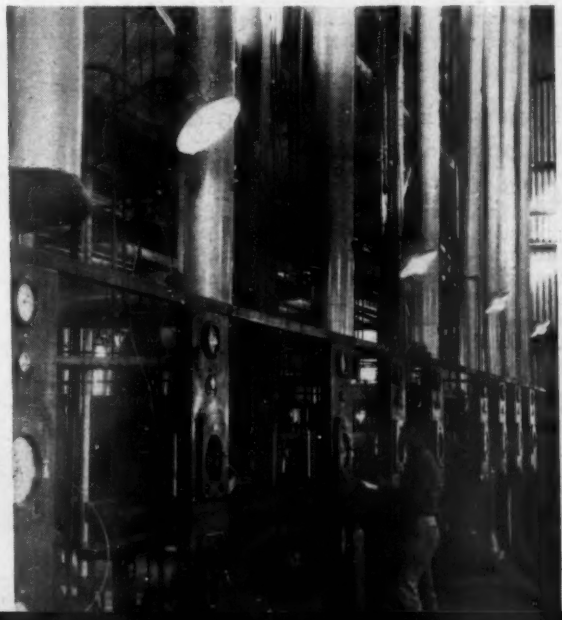
Last of the sections which make up the laboratory unit is the packaging department which handles the filling of containers with the different high-purity hydro-carbons which are shipped to points all over the world. Mainly used as reference standards and in analytical procedures, these products normally are supplied in small quanities. Shipping containers for the different products run from ordinary glass bottles to ICC-approved pressure bottles. According to the special products division of Phillips, under which the sales of high-purity individual carbons is handled, prices run from a few cents per gram for propane up to three or four times as great for butene-1 and some of the cycloparaffins.

Under the directorship of G. H. Short, who has been in the Phillips organization for the past 10 years, the new laboratory unit at present employs approximately 100 technicians and technologists.

Equipment and piping in one semiworks unit



Portion of precision fractionation equipment



OPERATING IDEAS

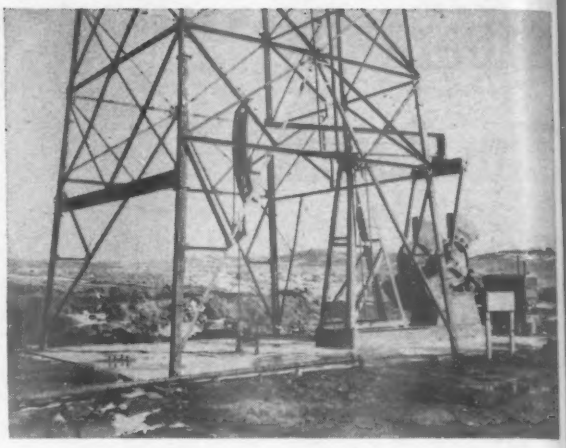
Butane Vaporizer Uses Engine Radiator Water

THE butane vaporizer shown in the accompanying picture (foreground) makes use of hot water from the radiators of the drilling engines as the heating medium. It consists of a horizontal shell of desired length and diameter closed at both ends around a coil of 1-in. pipe through which the radiator water is circulated. The liquid butane is fed by gravity and

vapor pressure from the adjacent fuel tanks to one end of the shell. Passing through the shell it is heated in exchange of heat from the hot water coil and is discharged at the opposite end as vapor to the engine fuel line. The radiator water is circulated in a closed system by means of a small pump located under the engine floor which takes suction from a hot water header with connections to the radiators, and returns the water to a radiator inlet header.

Concrete Base for Drilling and Completed Wells

ONE large company follows the practice of providing a reinforced-concrete base under wells drilled in proved areas. The slabs are laid as a part of the preparation of locations for drilling and cover the entire ground area under the derrick and engine substructures. They conform to a standardized design and are constructed to be used as a foundation not only for the drilling rig but also for the pumping derrick and pumping unit upon completion of the well. A square opening is left in the center of the slab for the cellar while drilling, and for the well head at completion of the well. A flow-line connection also is laid in advance under the slab from the cellar to a point at one side of the slab. There are two standard designs, one a square slab for use when regular drilling derricks are to be used, and the other a square with a reduced width



extension at the back to accommodate collapsible or jack-knife derrick rigs. The slab in the accompanying picture was laid for a jack-knife derrick-type rig and is 28 ft. square under the derrick with a 16-ft. long by 26-ft. wide extension at the back for the engine foundation. Slabs are 6 to 8 in. thick. The concrete provides a clean and dry working space under the derrick during drilling and also a substantial and easily maintained floor for the completed well.

Quick Connections for Portable Equipment

CONSIDERABLE time and the necessity of hauling pipe, fittings, etc., are entailed in laying gas and water lines to temporary equipment that is moved from location to location in the field. From one work spot, the lines must be dismantled, loaded, moved to the new location, restrung, and connected. In move to move, the distances between connections usually are variable, and one time there will be a surplus of line, the next a shortage where more joints and fittings are needed. One operator in moving a portable cleanout machine at short intervals from place to place, has saved time on this phase by using a 1,000-ft. length of 1-in. i.d. synthetic, oil and gas-resistant rubber hose. One end is connected to any convenient point on the field residue gas system, the other has a quick-joint union to the carburetion manifold of the engine, and in 10 minutes the gas supply is in operation. In ordinary service the hose is mounted on a portable reel for safekeeping and ease of handling.

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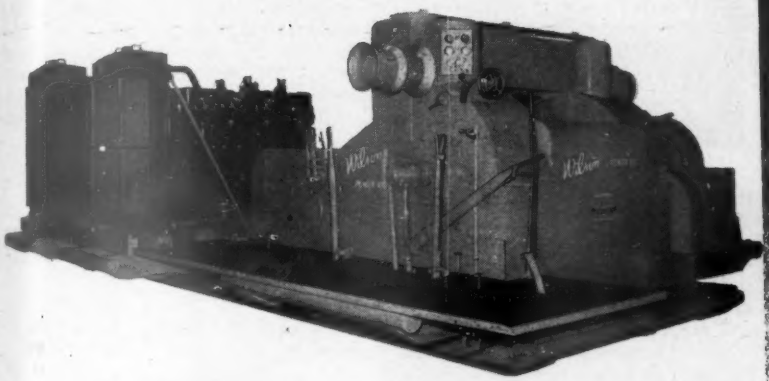

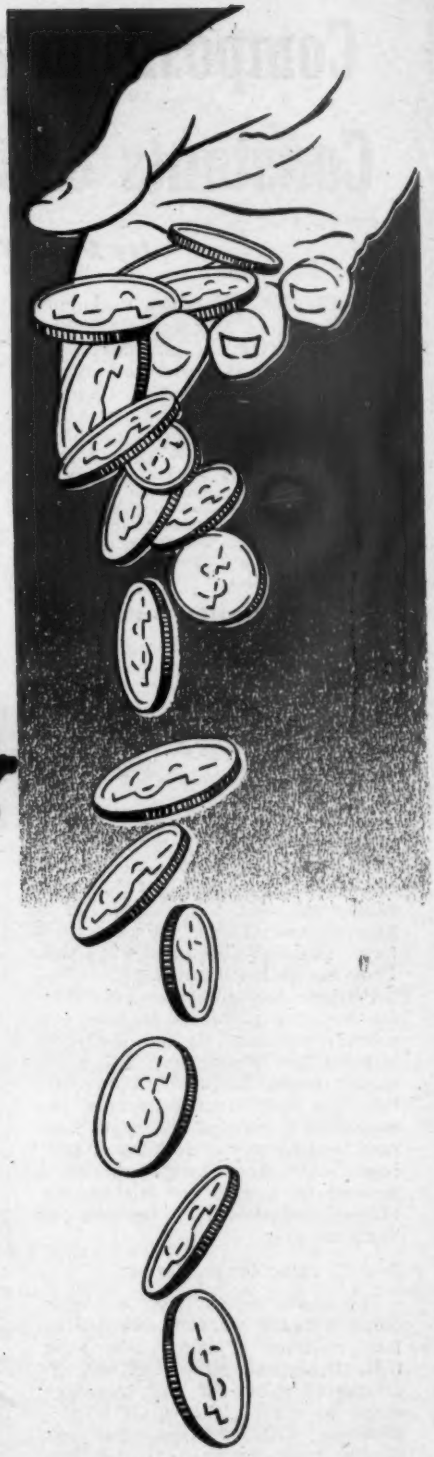

To say that the WILSON is the most powerful of all power rigs is not boastful, as we do not mean it that way. We know of no other power rig that has drilled to the same depth or demonstrated its actual power capacity as the WILSON. The improvement and careful engineering of WILSON POWER RIGS over a period of sixteen years has something to do with this. When important features are built into a rig, whenever the performance of a rig breaks new records, the WILSON generally *sets the pace*. Before buying a new rig, look up the record of any of the WILSON'S now in service. Models available for drilling to 15,000 feet and deeper.

Ask for literature describing the NEW WILSON MODELS with Vaca-Manual Drum Clutch Control and many other outstanding features.

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Composition and Physical Constants of Hydrocarbons

*by Park J. Jones**

Mechanics of Producing Oil, Condensate, and Natural Gas

PART 11 OF A SERIES

An extensive knowledge of hydrocarbons is not essential in production. But a knowledge of the rudiments on the composition of natural gas and oil is helpful. These are discussed briefly in this article. Physical constants of hydrocarbons are used in estimating gas-oil ratios, grains-per-million content of a gas, barrels of condensate in a million cubic feet of gas, and many other material balance calculations in general. The constants commonly used in production for hydrocarbons, and for the impurities found in hydrocarbons, are given in terms convenient for field purposes. The application of the constants will be illustrated by numerous examples in later articles.

A HYDROCARBON is a chemical compound. It consists of hydrogen and carbon atoms. These atoms can combine to form thousands of different hydrocarbons. Chemists group hydrocarbons into series. The principal series are as follows:

Series—	Formula	Stability	Structure
Paraffin	C_nH_{2n+2}	Saturated	Chain
Olefin	C_nH_{2n}	Unsaturated	Chain
Diolefin	C_nH_{2n-2}	Unsaturated	Chain
Acetylene	C_nH_{2n-2}	Unsaturated	Chain
Naphthene	C_nH_{2n}	Saturated	Ring
Benzene	C_nH_{2n-6}	Unsaturated	Ring

The Paraffin Series

Natural gases are composed predominantly of the first six members of the paraffin series. They are called methane, ethane, propane, butane, pentane, and hexane. The first three members have only one possible arrangement of carbon and hydrogen atoms. But butane, the fourth member, has two arrangements. One of these is called isobutane and the other, normal butane. The latter corresponds to a straight-chain arrangement and the former, to a branch chain. These two compounds have slightly different properties. They are called isomers.

Pentane has three isomers. They are included under isopentane and normal pentane. Hexane has five isomers. But in practice they are included under hexanes. Apparently, there is insufficient difference between the isomers of hexane to warrant separation for production purposes. All other hydrocarbons, if present in a gas, are customarily lumped together and reported as heptanes plus.

The Other Series

The olefin series have a double bond between carbon atoms. The first member is called ethene or C_2H_4. If methyl group, CH_3, is substituted for one of the hydrogen atoms in ethane, the result is propene or C_3H_6. Propene has one double bond between two carbon atoms. The corresponding member in the paraffin series, propane, has no double bonds. Similarly, for each member in the paraffin series there is a corresponding member in the olefin series that has one double bond and two fewer hydrogen atoms.

The diolefin series consists of hydrocarbons in which there are two groups of carbon atoms having double bonds between them. One member is called isoprene, C_5H_8. Isoprene is used for making one type of synthetic rubber.

The acetylene series consists of hydrocarbons having three bonds between two carbon atoms. The first member of this series is acetylene, C_2H_2. The members of the acetylene series are unstable relative to the stability of olefins and diolefins.

The members of the naphthene series have a ring-type structure. One member of this series is called cyclopentane, C_5H_{10}. Another is called cyclohexane, C_6H_{12}. The constituents in crude oil having comparatively high molecular weight for a given gravity or boiling range are believed to be predominantly naphthenes.

The members of the benzene series have a ring-type structure. The simplest compound in this series is called benzene, C_6H_6. If a methyl group, CH_3, is substituted for one of the hydrogen atoms in benzene, the result is toluene, C_7H_8. Toluene is used in making TNT. The compounds containing the benzene ring are called aromatics. Aromatics are distinguished from the chain-type compounds which are called aliphatics.

Composition of Oil

Upon separation of solution gas from a reservoir liquid, the resulting substance is broadly classified either as a paraffin-base oil or as an asphalt-base oil. Upon distillation of an oil, it is found that paraffins predominate in the low boiling range; naphthenes in the middle boiling range; and aromatics, naphthenes, and some unsaturated hydrocarbons, in the high-boiling range. The composition of the cuts obtained by distillation of a paraffin-base oil and an asphalt-base oil may be illustrated as follows:

PARAFFIN-BASE OIL

	Per cent		
Temp., °F.—	Paraffins	Naphthenes	Aromatics
100 to 200	70	28	2
200 to 250	65	30	5
250 to 300	60	30	10
300 to 400	50	35	15
400 to 500	50	30	20
500 to 600	45	25	30

ASPHALT-BASE OIL

100 to 200	65	30	5
200 to 250	50	45	5
250 to 300	35	55	10
300 to 400	30	55	15
400 to 500	25	50	25
500 to 600	25	40	35

The composition of a reservoir liquid, a separator liquid, or an oil is reported by components through hexane. All other hydrocarbons are commonly lumped together and reported as heptanes plus. Obviously, the heptanes plus constituent of an oil includes compounds which are not members of the paraffin series. The first complete analysis of a barrel of oil is yet to be made.

Impurities in Gas and Oil

The principal impurities found in natural gas are as follows:

1. Hydrogen sulfide
2. Helium
3. Carbon dioxide
4. Nitrogen
5. Oxygen
6. Water vapor

Hydrogen sulfide causes corrosion. Small quantities of this impurity render natural gas unfit for general use unless its H_2S content is eliminated. The hydrogen sulfide content of a gas is commonly expressed in grains per hundred cubic feet.

Water vapor in natural gas may

*Production consultant, Houston.

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TABLE 11-1—PHYSICAL CONSTANTS FOR HYDROCARBONS

Component symbol—	Methane C_1	Ethane C_2	Propane C_3	i-Butane i-C_4	n-Butane n-C_4	i-Pentane i-C_5	n-Pentane n-C_5	Hexanes C_6	Heptanes C_7	Heptanes+ C_{7+}
Molecular weight	16.04	30.07	44.10	58.12	58.12	72.15	72.15	86.17	100.20	M
1/(Mol. Wt.)	.0623	.0333	.0227	.0172	.0172	.0139	.0139	.0116	.00998	1/M
Sp. Gr. (water = 1)	.300	.378	.509	.5640	.5840	.6240	.6310	.6640	.68800	S
1/(Sp. Gr.)	3.333	2.645	1.965	1.773	1.712	1.603	1.585	1.506	1.453	1/S
Mol. Wt./Sp. Gr.	53.46	79.54	86.67	103.0	99.50	115.7	114.4	129.8	145.6	M/S
Sp. Gr./Mol. Wt.	.0187	.0126	.0116	.00970	.0100	.00867	.00877	.00770	.00686	S/M
Lb. per gal. liq.	2.50	3.15	4.24	4.70	4.86	5.20	5.26	5.53	5.73	8.334S
Lb. per bbl. liq.	105	132	178	197	204	218	221	232	241	350S
Lb. per cu. ft. liq.	18.70	23.56	31.73	35.16	36.41	38.90	39.34	41.39	42.89	62.34S
Cu. ft. liq. per lb.	.0535	.0424	.0315	.0284	.0275	.0257	.0254	.0242	.0233	.01604/S
Cu. ft. gas per lb.	23.61	12.62	8.60	6.52	6.52	5.27	5.27	4.40	3.78	379/M
Gas gravity (air = 1)	.554	1.038	1.522	2.006	2.006	2.490	2.490	2.974	3.459	M/28.97
Lb. per M.c.f.	42.33	79.35	116.4	153.4	153.4	190.4	190.4	227.4	264.4	2.639M
Gal. per M.c.f.	16.94	25.20	27.46	32.63	31.52	36.65	36.24	41.12	46.13	.3168M/S
Bbl. per M.M.c.f.	403	600	654	777	751	873	863	979	1098	7.543M/S
Cu. ft. gas per gal.	59.03	39.78	36.32	30.62	31.57	27.37	27.69	24.31	21.66	3157S/M
M.c.f. per bbl.	2.48	1.67	1.54	1.29	1.33	1.15	1.16	1.02	.910	132.6S/M

TABLE 11-2—PHYSICAL CONSTANTS FOR IMPURITIES

Formula—	Carbon dioxide CO_2	Nitrogen N_2	Oxygen O_2	Air	Hydrogen sulfide H_2S	Hydrogen H_2	Water H_2O
Molecular weight	44.01	28.02	32.00	28.97	34.08	2.02	18.02
1/(Mol. wt.	0.0227	0.0357	0.0312	0.0345	0.0293	0.4950	0.0555
Sp. gravity	1.22	....	....	....	0.79	....	1.000
1/(Sp. gravity)	0.820	....	....	....	1.266	....	1.000
Gravity (air = 1)	1.519	0.967	1.105	1.000	1.176	0.0697	0.622
Critical pres., p.s.i.a.	1072	492	731	546	1037	188	3206
Critical temp., °F.	88	—233	—182	—222	213	—251	705

cause corrosion and it may form hydrates. A number of producing operations require drying of gases to prevent freezing of lines and to reduce corrosion.

Small quantities of impurities in natural gas are included with methane for the purposes of making material balance computations. Significant quantities are considered as components of a gas.

The principal impurities found in oil are as follows: Free carbon and plastic substances, nitrogen and oxygen compounds, sulfur compounds, naphthenic acids, inorganic salts, hydrogen sulfide, water, and sand and mud.

Physical Constants of Hydrocarbons

Physical constants of hydrocarbons are used in computations of gas-oil ratios, grains per million content of a gas, barrels of condensate per million cubic feet of reservoir gas, and all other material balance calculations in general. The physical constants commonly used for production purposes are listed in Table 11-1. They are based on C.N.G.A. and N.G.A.A. data.

The mass of a compound numerically equal to the molecular weight of the compound in mass units is called a mole. For example, 18.02 is the molecular weight of water and 18.02 lb. of water is therefore a mole of water, 28.97 lb. of air is mole of air, and 16.04 lb. of methane is a mole of methane.

Specific gravity of substances relative to water is based on 62.34 lb. of water per cubic feet at standard conditions. Specific gravity relative to air is based on 28.97 lb. per mole of air. The reciprocals of specific gravity and molecular weight are included for convenience.

Cubic feet of gas per pound of gas is in terms of 379 cu. ft. per pound mole at standard conditions. In practice, constants in terms of barrels, M.c.f. and M.M.c.f. are convenient and therefore have been included. To obtain cubic feet of gas per barrel, multiply the bottom line by 1,000. All values for the heptanes plus constituents of a gas or liquid are expressed in terms of specific gravity and molecular weight. Physical constants for impurities are listed in Table 11-2. Numerous applications of the constants in Table 11-1 will be illustrated in later articles.

References

1. C.N.G.A. physical constants.
2. N.G.A.A. physical constants.
3. Nelson, W. L., Petroleum Refining Engineering (1941), McGraw-Hill Book Co.

Drilling and Completion Practices

(Continued from page 59)

of the wells. The majority of acidizing in these has been in the Burns and Brundidge (chert conglomerate) of the Pennsylvanian series; in a few cases acidizing has been done in the Viola lime.

Customary methods of acidizing are employed by injection through perforated casing after tubing has been run. On typical wells, breaks occur between 500 and 800 lb.; pressure drops after the pressure breaks average about 200 lb. Low-surface-tension acid is generally used in the area which has the advantage of giving easier penetration into the formation; it also makes possible a quicker and more thorough cleanup of spent solution so that nothing is left to impede production. This type of acid reduces susceptibility of the crude oil to emulsification during production from the treated formations.

After acidizing at East Pauls Valley, the well is swabbed in through the tubing and cleaned into the pits. If the oil is not produced in a satisfactory volume, stage acidizing is resorted to, with a second shot of acid, usually approximately 2,000 gal. which is twice the amount of the first shot. In case there is no tendency for the well to flow after the second shot of acid, a packer is set.

Producing Formations

Following acidizing, it has been necessary in some instances to squeeze in order to correct conditions arising when acidizing has resulted in bringing gas into wells from an upper zone.

Some comment should be made regarding the Pennsylvanian producing formations. Both the Burns and the Brundidge zones are referred to as "reworked." In the Burns there are indications of the presence of a Bromide type of sand while in the Brundidge there is more evidence of lime which appears to be Viola. Of the two, the Burns zones are more regular with alternating sand, lime and limy sand strata, totaling 30 to 40 ft. of which 15 ft. may be good productive blanket sand. The Brundidge (chert conglomerate) is quite complex, being spotted with some sandy zones.

The A.P.I. gravity of the oil in East Pauls Valley is as follows: Burns, Brundage and some Viola wells, 32° to 33°; Bromide and in one Viola well, 6° to 11°.

The structure is a gas-cap structure. Bottom-hole pressures of 1,000 lb. have been reported.

In addition to Ohio Oil Co., largest operator in the pool, other operators in the pool are: Phillips Petroleum Co., Cox & Hamon, Texas Co., Ramsey Petroleum Co. and Gilmer Oil Co.

Utilization of Salt Water In Illinois Oil Fields

by Samuel F. Peterson

TO raise a pertinent question, why isn't the salt-water situation handled by the operators in a pool on a cooperative basis to return it to the producing formation? Such a procedure will help restore reservoir pressure; wash the residual oil from the stratum and force it up the structural dip where it will accumulate at the well bores. At the present time there is no better method known than to use salt water for this flushing and driving purpose. It is generally conceded that when an oil pool has reached the depletion stage and is ready for abandonment, between 50 and 75 per cent of the oil still remains in the producing formation.

It should appeal to one's considered judgment that if withdrawal of oil and salt water from a producing formation amounts to a considerable volume, then the salt water withdrawn should be returned to the producing stratum to offset in part this displacement of volume. This return of salt water will augment the depleted reservoir pressure. Usually, by the time the limits of an oil pool have been defined, there are a number of edge wells ready for abandonment. Instead of plugging these wells, operators in the pool should make arrangements with the Division of Oil and Gas Conservation to leave the casings in the wells and reserve them for future salt water disposal into the producing stratum. (See Rule C-1, Paragraph C of the Department's Rules and Regulations).

The author is a petroleum engineer with the Oil and Gas Division of the Department of Mines and Minerals of the State of Illinois. A graduate of University of Chicago, where he majored in geology, he also attended Armour Institute of Technology. He was employed as chief geologist of Barnsdall Oil Co. in Oklahoma, and later with Atlantic Gulf West Indies in Mexico. From 1921 to 1939 he was active as an oil and gas operator in Oklahoma and Kansas. He has held his present post since 1941, where his duties consist of handling permits to drill, and checking protective work in relation to oil-field problems. He writes oil-conservation legislation, and rules and regulations for the department. He is an active member of the research and coordinating committee and regulatory practices committee of the Interstate Oil Compact Commission.

Salt water has always been an enigma to the oil operator. It is looked upon as a burdensome by-product of oil production. In water-drive pools it is axiomatic that as oil production dwindles, the volume of salt water increases. In a water-drive pool, salt water is the chief motivating force. When it makes its appearance in a pool, the occurrence is not widespread, but in localized areas. It usually appears first in edge wells which are located at low points on the structure. Due to this localization and slow, migratory progression over the structure, salt-water disposal has long been considered an individual problem by the operator so affected, and not as a problem concerning all operators in the pool. Were salt water to appear simultaneously throughout the pool, the problem would more than likely receive the cooperative attention of all the operators.

When salt water first makes its appearance, the operator constructs pits to contain it, hoping it will evaporate or that he may drain it into nearby streams during flood stage. In Illinois the evaporation index is so low as to be practically negligible so far as being an aid in keeping ahead of salt-water accumulation. Cultivated land is usually present in or adjacent to oil pools, so that crop and livestock damage is unavoidable and somewhat expensive to the operator, should salt water be permitted to escape. In addition, there are 24 critical areas of public water supplies in the Illinois basin supervised by the State Sanitary Water Board, to prevent salt-water pollution of streams draining into these areas. The plant location and source of water supply is given below:

Plant location—	Source of supply
Carmi	Little Wabash
Albion	Baupas Creek
Centralia	Lake Centralia, Raccoon Creek
Flora	Little Wabash
Olney	Fox River
Vandalia	Kaskaskia
Mount Carmel	Wabash
New Athens	Kaskaskia
Fairfield	Little Wabash
Carlyle	Kaskaskia
Zeigler	Big Muddy
Royalton	Big Muddy
Evansville	Kaskaskia
Vandalia State Farm	Kaskaskia
Clay City	Little Wabash
Louisville	Little Wabash
Mount Vernon	Casey Fork
Salem	Pipe line to Kaskaskia, 19-mile; auxiliary source
Murphysboro	Big Muddy
Newton	Embarrass Creek
Muscoutah	Silver Creek
Freeburg	Silver Creek
Pinckneyville	Beaucoup Creek
Benton	Big Muddy Creek

A wide range of industries are also utilizing these streams for boiler-water supply and have experienced considerable difficulty in the past due to salt-water pollution. It is estimated that in excess of 95

Typical example of filling brine pits to overflowing, thus destroying vegetation, and polluting streams

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per cent of all salt-water violations occurring in Illinois oil pools are due to seepage through and overflow of the embankments.

As the volume of salt water increases beyond pit capacity, the operator is forced to drill a salt-water-disposal well or convert a depleted oil well to a disposal well. In the majority of cases, the salt water is returned to a nonproducing or barren formation of high porosity sufficient to accommodate a large volume. Operators almost invariably have selected shallow, barren sands above the producing formation in which to dispose salt water. When pressure has been applied, the salt water in a number of instances has broken out in poorly plugged wells or has come to the surface around the outside of the casing in wells where the casing has not been cemented above the disposal formation. Should the amount of salt water not exceed several hundred barrels daily, the disposal formation can usually absorb the water by gravity. When, however, the volume to be injected approaches a thousand or more barrels a day, pumps must be installed and the salt water forced into the formation at high pressures. Most all of these disposal operations are carried on individually by the operators in the pool.

Since the Division of Oil and Gas Conservation came into existence in July 1941, 126 permits have been issued for salt-water-disposal wells. Of this number only 17 permits have been issued to inject salt water into the producing oil formation. (Permits for water-flood wells not included in this number).

Expense Is Justified

When one considers the large amounts of money spent by individual operators for salt-water pits, settling basins, filtering systems, disposal wells, crop and livestock damages and stream pollution, the expense of cooperative effort should be amply justified. An ideal plan would be to unitize the entire pool for a water-flood project under the supervision of an operators advisory committee. Either a unitized project or a cooperative program will eliminate the unnecessary duplication of pits, settling basins, filtering systems, compressors, tanks, and disposal wells throughout the pool.

An unusual opportunity presents itself for some agency, such as the Illinois-Indiana Oil Association, the Independent Oil Operators Association of Illinois, or an oil operators engineering committee to encourage cooperative action toward utilizing salt water for a two-fold purpose:

1. To dispose of salt water into a common source, namely the producing stratum.
2. To utilize salt water as an agent to recover the maximum ultimate yield of oil in the reservoir.

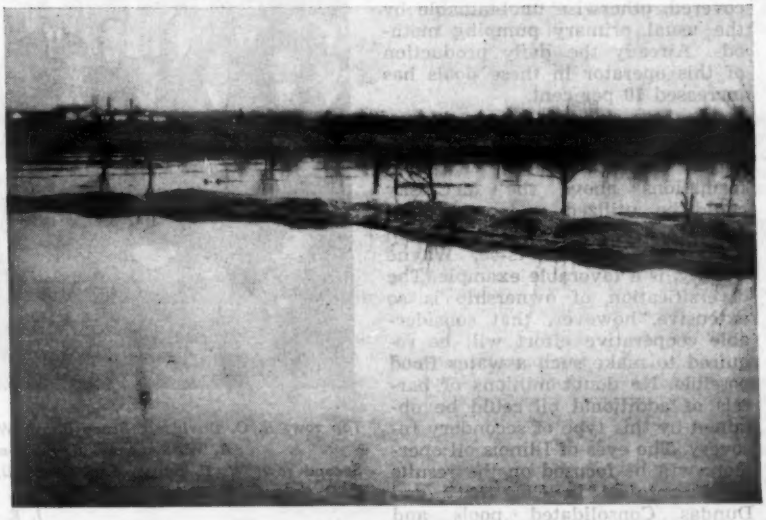
Problems will arise in invoking a cooperative program. Studies should be made of cores and cuttings to determine porosity, permeability, saturation point, and lensing characteristics of the producing formation to be flooded, as well as the subsurface geological conditions. Haphazard, trial-and-error methods and uncontrolled floods should give way to scientific approach and controlled floods. Prejudices among operators and landowners around the perimeter of the pool must be dispelled. Valid objections offered by them must be met and compensated equitably. For instance, edge-well operators and landowners may object to salt-water disposal being made in the producing formation. They may contend that the oil on their lease will bypass their wells before they can recover their just share of the oil. These edge-well operators and landowners could be paid a minimum rate per barrel for salt water disposed, when their abandoned wells are used, to compensate them for casing, possible loss of oil, and use of surface area required for salt-water-disposal purposes. An equitable plan could be formulated and disposal details handled by an operators engineering committee to make the plan practical.

There seems to be some reluctance among many operators to introduce water into a producing formation before the entire pool is ready for abandonment. It seems to be a "last resort measure" in their minds. It can work a considerable hardship at times. For example, many operators will have wells in a pool no longer profitable to operate, and they are receptive to flooding the oil stratum. However, a few operators in the pool may have wells on their leases quite profitable who look upon any flooding effort by individual operators with considerable distrust, and they are in a position to block such disposal efforts. As time goes on, this disposal problem will become more and more acute in Illinois.

A notable example of utilizing salt water for the recovery of residual oil is now in operation in the Dundas Consolidated and Clay City Consolidated pools located in Townships 3, 4 and 5n, Ranges 9 and 10e, Jasper and Richland counties, and in Townships 1, 2 and 3n, Ranges 7 and 8e, Clay County, Illinois. Both of these pools are dissolved gas drive in the McClosky lime. Salt water is not present in sufficient quantities in the producing formation to flood the oil upstructure.

The feasibility of using salt water from the basal portion of the Cypress sand and permitting it to flow by gravity into the McClosky lime was indicated by an accidental flood in the Noble pool, which occurred in Sections 33 and 34-4n-9e, and 3-3n-9e, Richland County. About the time the oil wells in this accidental flood area had reached their economic productive limit and were ready for abandonment, water escaped from the lower Cypress and flooded the McClosky producing formation. Within a period of 18 months some of these depleted wells had produced more oil than was originally produced up to the time this accidental flood commenced.

Upon application, the Division of Oil and Gas Conservation gave permission to Pure Oil Co. for the conversion of three depleted wells for experimental purposes to dispose of fresh water into the McClosky lime by gravity. These wells were located as follows:



Volume of salt water exceeds capacity of pits. A salt-water-disposal well is necessary to handle this large volume

1. C. D. Duff "A" 3, 32-3n-8e, Clay County.

2. A. G. Stanford 4, 32-3n-8e, Clay County.

3. Clay City Banking Co. "A" 8, 6-2n-8e, Clay County.

The result was so satisfactory in increased production of adjacent wells that Pure Oil controlling the majority of the leases in Clay City and Dundas Consolidated fields, made application for 24 injection wells under a pool-wide flood project in these fields. The applicant operates 491 McClosky wells in the Clay City Consolidated and 345 Mcclosky wells in the Dundas Consolidated pools. Out of a total of 836 McClosky wells, 224 of them were ready for abandonment, being no longer profitable to operate. A hearing was held by the department on July 28, 1944, and permission was granted to perforate the casing opposite the basal portion of the Cypress sand which is saturated with salt water and is barren of oil in the upper portion of the Cypress. Remedial measures will be undertaken to protect upper formations, by cementing back of the casing. The salt water is permitted to flow by gravity into the porous McClosky lime producing horizon. The control of salt-water flow in each well can be governed by an installation of tubing and packer similar to that used in dual-completion wells. This utilization of salt water from an upper formation is an extremely economical method of water flooding deeper formations. No filtering system (open or closed type), pumps, compressors, or tanks are needed. Old wells ready for abandonment are converted, therefore none need be drilled and the pumping equipment can be salvaged from these wells. It is anticipated that millions of barrels of oil can be recovered, otherwise unobtainable by the usual primary pumping methods. Already the daily production of this operator in these pools has increased 10 per cent.

There are a number of pools in Illinois producing from the McClosky lime where salt water in formations above the McClosky could be utilized under force of gravity. The Johnsonville pool in Townships 1n and 1s-6e, Wayne County, is a favorable example. The diversification of ownership is so extensive, however, that considerable cooperative effort will be required to make such a water flood possible. No doubt millions of barrels of additional oil could be obtained by this type of secondary recovery. The eyes of Illinois oil operators will be focused on the results of the project in Clay City and Dundas Consolidated pools and much additional informative data will be available in the coming year.

Phillips Conducts Safety Course

BELIEVING that wartime is no time to skimp on safety in its production of highly volatile petroleum products, Phillips Petroleum Co. has added eight men to its safety department and put all of its safety personnel through one of the most comprehensive safety schools ever to be conducted for oil-company employes.

The school and the expanded personnel is the company's answer to a rising tide of accidents induced by wartime activities and the double handicap of losing experienced employes to the armed services. The school served the dual purpose of a "refresher" course for oldtimers and a course in fundamentals for the eight beginners who had no previous training or safety experience but did have many years of operation experience in various departments.

Taking advantage of the existing E.S.M.W.T. program, Phillips arranged through Lowell C. Brown of Oklahoma University for a special 72-hour safety engineering course, and with G. M. Kintz of the U.S. Bureau of Mines, for the bureau's 20-hour gas course, this latter course to be included as part of the 72-hour school.

Dividing the school into two 6-day sessions allowed the trainees a breathing spell and an opportunity to digest their new information during a 2-week interim. It also permitted the attendance of employes who could not have attended otherwise because of job responsibilities. Six hours of classes were conducted for 6 days during each of the two sessions, but in reality a total of nearly 90 hours were spent in classes because of student interest.

Class instructors were some of the industry's outstanding safety engineers and experts in related fields. They were:

H. W. Boggess, Sinclair Prairie Oil Co.; D. A. Klemme, Stanolind Oil & Gas Co.; E. D. Murphey, Mid-Continent Petroleum Corp.; R. S. Huffman, Oklahoma Natural Gas Co.; H. H. Goff, Mistletoe Express Co.; G. M. Kintz, H. F. Browne, R. D. Bradford, and A. A. Munsch, U.S. Bureau of Mines; H. W. Richards, Mine Safety Appliance Co.; W. G. Engel, American Optical Co., and James A. Harte, American La-France Foamite Corp.

The "student body" represented a cross section of Phillips activities and brought together in Bartlesville employes from all major points of company operation. Classes were frequently attended by headquarters executives vitally interested in the company's accident-experience curve.

The school closed with a banquet at which certificates were presented to 24 students by Dr. F. A. Balyeat of Oklahoma University for having completed the course. Thirteen of these graduates were full-time safety men and the remainder represented supervisors of seven different departments. Twenty-four certificates were also awarded for completing the Bureau of Mines Gas Course.

Top row: R. C. Davidson, Bruce Baird, Warren L. Felton, E. M. Miller, J. J. Donegan, A. W. Sweeney, R. H. Gould, W. R. Talley, G. E. Danch

Second row: W. F. Burris, E. J. Gatchell, F. B. Bayless, C. C. Weiss, L. M. Coburn, C. C. Tate, O. R. Kiphart, Wilmoth Clark, J. E. Bondurant, E. P. Wilkins, S. S. Learned, J. E. Skipton

Seated: S. F. Spargo, J. W. Logan, R. M. Wilson, Haskell Jordan, L. C. McGill, G. Leatherman, C. E. Cure, F. E. Rice, J. A. Price, F. A. Balyeat

Cracking of Latin American Crude Oils

*by Dr. Gustav Egloff**

ABSTRACT

Cracking and reduced crudes from Comodoro Rivadavia and other Argentine fields showed gasoline yields, 392° F. end point, of 28 to about 40 per cent, with residua of viscosities ranging from 222 to 462 seconds Furol. Suitable gum stability was obtained in the gasolines with amounts of inhibitor up to 0.025 per cent. Clay treatment in some cases eliminated the need for gum inhibitor.

7—ARGENTINE OILS

THE Argentine petroleum industry dates from 1907 when oil was discovered in the Comodoro Rivadavia field, although 10 years later the annual production was less than 1,000,000 bbl. This field still accounted for practically all of the annual production of 6,000,000 bbl. in 1925, although a considerable amount of oil was then being produced in the Plaza Huincul district.[1] With the bringing in of other wells in the Salta and Mendoza provinces, the 1941 production of Argentine crude totaled 22,013,472 bbl., of which the Comodoro Rivadavia field accounted for 15,716,811 bbl., or 71.3 per cent.[2] The total Argentine production for 1943 was 23,500,000 bbl.[3]

The crude oils produced in the Comodoro Rivadavia field vary considerably in character. Some are asphaltic and others are paraffinic, with A.P.I. gravities varying from about 10° to about 31°.[4] The suitability for cracking of crude oils and their residua from this area was determined in a number of two-coil pilot-plant runs. The properties of two representative crude oils are listed in Table 1. Crude oil No. 1 is typical of the lighter and more paraffinic types, and crude No. 2 is representative of those of a mixed base character.

*Director of research, Universal Oil Products Co.

TABLE 1—PROPERTIES OF ARGENTINE CRUDE OILS

Crude No.—	1	2
Gravity, °A.P.I.	28.0	19.1
Sulfur, %	0.09	0.15
Viscosity, Furol at 122° F., sec.	...	226
Universal viscosity at 100° F., sec.	249	...
B.s. and w., %	...	0.7
Cold test, °F.	...	25
Salt as sodium chloride, lb./1,000 bbl.	...	797
Characterization factor	...	11.89
100 ml. distillation:		
Distilled over, %	92.0	91.0
Coke, % by weight	7.4	8.6
Distilled at 400° F.	17.0	...
Distilled at 572° F.	...	7.0

Low A.S.T.M. Number

The paraffinic character of the gasoline from the lighter crude oil is indicated by the low A.S.T.M. octane number of 36, and the characterization factor of 12.05. The high initial boiling point of 184° F. partly accounts for the low-octane number of the stock. The flash point of 143° F. shown by the kerosene indicates that in this respect it meets commercial requirements. The reduced crude had a Furol viscosity of 227 seconds at 122° F., which would make it directly utilizable as a No. 6 A.S.T.M. fuel oil.

The reduced crude was cracked in a two-coil full-flashing operation to produce 400° F. end-point gasoline and residuum having Furol viscosity within the range of 100 to 300 seconds at 122° F., according to A.S.T.M. specifications for No. 6 oil. The operating conditions and yields of gasoline, residuum, and gas are given in Table 3, which also includes the propylene and butylene contents of the gas, and the amounts of polymer gasoline or alkylate which they are capable of producing. The properties of the gasoline, residuum, and gas are summarized in Table 4.

The whole No. 2 crude oil was cracked in a two-coil pilot plant using full-flashing operation to produce a 385° to 388° F. end-point gasoline, and a residual fuel oil hav-

TABLE 3—CRACKING REDUCED CRUDE OPERATING CONDITIONS AND YIELDS

Operating conditions:	
Temperature, °F.:	
Heavy oil coil	940
Light oil coil	970
Pressure, p.s.i.:	
Heavy oil coil	200
Light oil coil	250
Relative charging rate	2.24
Yields—vol. % of charge:	
Gasoline	40.5
Cracked residuum	53.9
Loss	5.6
Gas, cu. ft./bbl. charge	386
Propylene, vol. %	11.9
Isobutylene, vol. %	1.7
n-Butylene, vol. %	4.0
Polymer gasoline, vol. % of charge	2.8
or	
Propylene and butylene alkylate, vol. % of charge	5.1

TABLE 4—CRACKING REDUCED CRUDE PROPERTIES OF GASOLINE, DISTILLATE BOTTOMS, RESIDUA AND GAS

Untreated gasoline:	
Gravity, °A.P.I.	58.8
Vapor pressure (Reid), p.s.i.	8.1
Sulfur, %	0.04
Octane No. (A.S.T.M.)	67
100 ml. A.S.T.M. distillation:	
I.b.p., °F.	92
10%	142
50%	255
90%	353
E.b.p.	395
Distilled over, %	98.0
Bottoms, %	1.0
Loss, %	1.0
Distillate bottoms:	
Gravity, °A.P.I.	38.5
100 ml. distillation:	
I.b.p., °F.	420
10%	428
50%	445
90%	487
E.b.p.	525
Distilled over, %	98.0
Bottoms, %	2.0
Residuum:	
Gravity, °A.P.I.	10.9
Viscosity, Furol at 122° F., sec.	643
B.s. and w., %	6.2
Blended residuum:	
Gravity, °A.P.I.	12.9
Flash (Pensky-Martens), °F.	192
Viscosity, Furol at 122° F., sec.	208
Cold test, °F.	20
I.b.p., °F.	432
Distilled at 572° F., %	14.5
Conradson carbon, %	16.2
Gas, composition % by volume:	
Ethylene	6.0
Propylene and butylenes	17.6

TABLE 2—SEMICOMMERCIAL FRACTIONATION OF 28.0 GRAVITY NO. 1 CRUDE OIL

Product—	Gasoline	Kerosene	Reduced crude
Yield, volume per cent crude oil	13.1	17.5	69.0
Gravity, °A.P.I.	58.8	44.3	20.4
Sulfur, %	0.04	...	0.17
Characterization factor	12.05	11.95	12.0
100 ml. distillation:			
I.b.p., °F.	184	376	518
10%	225	393	615
50%	264	426	721
90%	309	484	Superheated
E.b.p.	350	514	742
Distilled over, %	98.5	98.0	89.5
Bottoms, %	1.5	2.0	...

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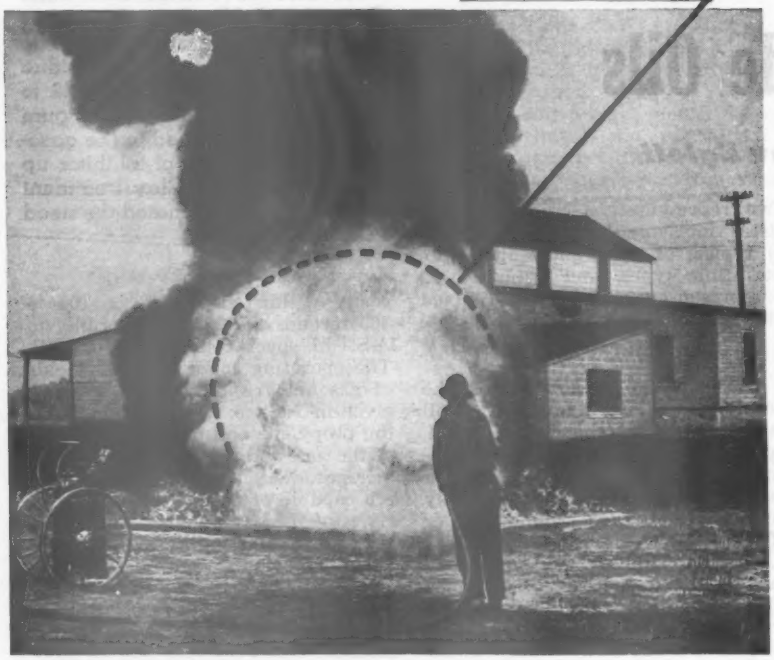

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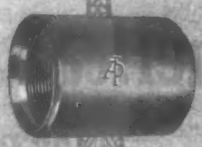

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ing a maximum of 300 seconds Furol viscosity at 122° F. Three runs were made on this stock, the operating conditions employed being shown in Table 5 along with the yields of gasoline, residuum, and gas from each run, and the potential polymer gasoline from run No. 2. The properties of the liquid products and a partial analysis of the gas are included in Table 6.

A representative cracked gasoline from the runs on crude No. 2 was treated with sodium plumbite solution and sulfur for sweetening, and a separate treatment was conducted on this gasoline by pumping it through clay in liquid phase at a temperature of 400° F. under 250 p.s.i. The improvements effected by these treatments are indicated by the data in Table 7, which compares the properties of the untreated and the treated gasolines.

Two-coil pilot-plant runs were also conducted on a topped crude produced in full-scale commercial operations. The properties of this stock are shown in Table 8. A highly paraffinic material is indicated by the cold test of 70° F., and the characterization factor of 12.2.

The topped crude was subjected to rather severe cracking in a series of four runs aimed at the production of residua of varying gravities, along with 392° F. end-point gasoline. The operating conditions and yields of gasoline, residuum, coke, and gas are summarized in Table 9. Heavy-oil transfer temperatures from 920° to 930° F. were used, and light-oil temperatures of 960° to 970° F. Pressures of 150 p.s.i. at the exit of the heavy oil coil, and 350 p.s.i. at the exit of the light-oil coil were maintained during all four runs. The extent of cracking was modified by the degree of fractionation of the cracked products and consequent variation in the recycle ratio. The properties of the cracked gasolines and residua from the four runs are given in Table 10.

TABLE 5—CRACKING COMODORO RIVADAVIA CRUDE, OPERATING CONDITIONS AND YIELDS

Run No.—	1	2	3
Operating conditions:			
Temperature, °F.:			
Heavy oil coil	925	935	935
Light oil coil	955	935	955
Pressure, p.s.i.:			
Heavy oil coil	200	200	210
Light oil coil	250	250	250
Relative charging rate	3.05	3.19	2.31
Yields, vol. % of charge:			
Gasoline	28.9	32.5	36.3
Residuum	65.1	61.6	55.9
Liquid volume loss	6.0	5.9	7.8
Gas, cu. ft./bbl. of charge	328	357	466
Propylene and higher olefins	...	17.9	...
Polymer gasoline, vol. % of charge	...	2.7	...

TABLE 6—CRACKING COMODORO RIVADAVIA CRUDE PROPERTIES OF UNTREATED GASOLINE, RESIDUUM AND GAS

Run No.—	1	2	3
Untreated gasoline:			
Gravity, °A.P.I.	59.2	59.2	58.4
Vapor pressure (Reid), p.s.i.	10.2	11.3	9.6
Sulfur, %	...	0.06	...
Octane No. (A.S.T.M.)	72	72	71
100 ml. A.S.T.M. distillation:			
I.b.p., °F.	100	92	110
10%	142	134	148
50%	246	246	249
90%	349	345	345
E.b.p.	393	383	383
Distilled over, %	96.5	95.5	95.0
Bottoms, %	1.0	1.0	1.0
Loss, %	2.5	3.5	4.0
Residuum:			
Gravity, °A.P.I.	14.1	13.0	10.5
Viscosity, Furol at 122° F.	222	272	462
100 ml. A.S.T.M. distillation:			
I.b.p., °F.	...	477	...
Per cent at 572° F.	...	3.5	...
Gas composition, % by vol.:			
Propylene and higher olefins	...	17.9	...

TABLE 7—CRACKING COMODORO RIVADAVIA CRUDE, TREATMENT OF CRACKED GASOLINE, OPERATING CONDITIONS, YIELDS, AND PROPERTIES OF PRODUCTS

Treatment—	None	Sweetened	Liquid-phase clay
Treated gasoline:			
Gravity, °A.P.I.	58.1	57.3	57.6
Vapor pressure (Reid), p.s.i.	8.2	7.8	7.0
Sulfur, %	0.06	0.07	0.05
Color, °Saybolt	—12	—12	30
Color, stability	...	...	24
Gum, mg./100 ml. copper dish:			
Without inhibitor	299	349	9
With 0.025% inhibitor No. 1	...	236	8
With 0.01% inhibitor No. 4	...	22	...
Oxygen bomb stability, Ind./min.:			
Without inhibitor	110	85	240
With 0.025% inhibitor No. 1	...	145	430
With 0.01% inhibitor No. 4	...	170	...
Octane No. (A.S.T.M.)	72	71	71
100 ml. A.S.T.M. distillation:			
I.b.p., °F.	121	122	116
10%	152	166	156
50%	248	252	252
90%	341	337	343
E.b.p.	385	385	389

TABLE 8 — CRACKING COMODORO RIVADAVIA TOPPED CRUDE PROPERTIES OF CHARGING STOCK

Gravity, °A.P.I.	23.8
Sulfur, %	0.16
Viscosity, Furol at 122° F., sec.	65
Cold test, °F.	70
B.s. and w., %	0.8
Characterization factor	12.2
100 ml. distillation:	
I.b.p.	396
10%	592
50%	706
90%	748
E.b.p.	750
Distilled over, %	94.0
Coke, % by wt.	6.1

Properties Improved

A representative gasoline from cracking run No. 3 was subjected to light treatments to improve and stabilize its properties. The amounts of treating reagents, treating losses, and the properties of the untreated and the three treated gasolines are summarized in Table 11. The sweetening treatment caused an apparent loss of 1-octane number and produced a gasoline of insufficient inhibitor susceptibility. inasmuch as 0.05 per cent of No. 1 inhibitor was required to lower its copper-dish gum content to 19 mg. and raise its oxygen bomb induction period from 90 to 220 minutes. The 1-lb.-per-well sulfuric acid treatment gave a satisfactory product after redistillation with steam.

The Sosneado field is in the province of Mendoza, 600 miles southwest of Buenos Aires. The properties of the crude oil from this district are shown in Table 12, the data indicating a relatively heavy asphaltic material. The whole crude was cracked in a pilot plant to produce 392° F. end-point gasoline and

heavy residuum. The operating conditions and yields of gasoline, residuum, and gas are summarized in Table 13. The properties of the cracked gasoline and the residuum are given in Table 14. The octane number of 83 exhibited by the cracked gasoline reflects the naphthenic character of the charge, and the residuum is distinctly asphaltic in character.

Sulfuric acid treatment of 10 lb. of acid per barrel produced a stable gasoline with 0.06 per cent sulfur content and 18 mg. of copper dish gum, with a loss of 4-octane numbers, Table 15.

TABLE 9—CRACKING COMODORO RIVADAVIA TOPPED CRUDE, OPERATING CONDITIONS AND YIELDS

Run No.—	1	2	3	4
Temperature:				
Heavy oil coil, °F.	920	...	...	930
Light oil coil, °F.	960	...	...	970
Pressure:				
Heavy oil coil p.s.i.	150	150	150	150
Light oil coil, p.s.i.	350	350	350	350
Yields—volume % of charging stock:				
Gasoline	47.3	51.6	52.2	57.7
Residuum	44.0	38.8	31.2	25.9
Liquid volume loss	8.7	9.6	16.6	16.4
Gas—cu. ft. per bbl. of charging stock	556	617	580	680

TABLE 10—CRACKING COMODORO RIVADAVIA TOPPED CRUDE, PROPERTIES OF CRACKED GASOLINE AND RESIDUUM

Run No.—	1	2	3	4
Untreated gasoline:				
Gravity, °A.P.I.	59.9	61.5	60.1	59.6
Vapor pressure (Reid), p.s.i.	8.9	9.7	9.8	7.2
Octane No.—A.S.T.M.	69	69	69	69
Research	78	79	...	79
100 ml. distillation:				
I.b.p., °F.	97	106	100	102
10%	140	138	142	144
50%	234	231	243	244
90%	324	328	342	350
E.b.p.	406	386	402	414
Distilled over, %	98.5	96.0	98.0	98.0
Bottoms, %	0.5	1.0	1.0	1.0
Loss, %	1.0	3.0	1.0	1.0
Residuum:				
Gravity, °A.P.I.	13.6	11.4	11.2	7.8
Viscosity, Furol at 122° F.	131	136	169	378
C.O.C. test, °F.	...	...	55	...
Initial boiling point, °F.	...	...	421	...

TABLE 11—CRACKING OF COMODORO RIVADAVIA TOPPED CRUDE, TREATMENT OF CRACKED GASOLINE, TREATING CONDITIONS, YIELDS, AND PROPERTIES OF TREATED GASOLINE

Acid, lb. per bbl.	None	None	1	4
Sodium plumbite, %, 8° Be.	None	3	1	1
Treated cracked gasoline:				
Gravity, °A.P.I.	60.1	...	61.4	61.3
Vapor pressure (Reid), p.s.i.	9.8	7.7	...	6.6
Sulfur, %	0.03	0.03	0.03	0.02
Color, °Saybolt	Brown	Yellow	25	29
Gum, mg./100 ml. (copper dish):				
Without inhibitor	154	189	12	1
With 0.025% No. 1 inhibitor	...	132	1	1
With 0.05% No. 1 inhibitor	60	19	...	...
Oxygen bomb stability, induction period, minutes:				
Without inhibitor	110	90	160	265
With 0.025% No. 1 inhibitor	...	160	450	890
With 0.05% No. 1 inhibitor	...	220	...	...
Octane No. (A.S.T.M.)	69	68	67	...
100 ml. A.S.T.C. distillation:				
I.b.p.	100	...	108	110
10%	142	...	147	147
50%	243	...	238	238
90%	342	...	332	328
E.b.p.	402	...	380	380
Distilled over, %	98.0	...	97.0	98.0
Bottoms, %	1.0	...	1.0	1.0
Loss, %	1.0	...	2.0	1.0

TABLE 12—PROPERTIES OF SOSNEADO CRUDE

Gravity, °A.P.I.	11.2
Sulfur, %	1.26
Viscosity, Furol at 122° F., sec.	1,178
Cold test, °F.	55
B.s. and w., %	4.4
Water, %	3.7
100 ml. A.S.T.M. distillation:	
I.b.p., °F.	266
10%	586
50%	699
80%	746
Distilled over, %	86.5
Coke, % by wt.	13.1

TABLE 13—CRACKING SOSNEADO CRUDE, OPERATING CONDITIONS AND YIELDS

Operating conditions:	
Temperature, °F.	941
Pressure, p.s.i.	181
Relative charging rate	1.33
Yields, vol. % of charging stock:	
Gasoline	31.3
Residuum	60.9
Gas and loss	7.8
Gas, cu. ft. per bbl. charging stock	280

TABLE 14 — CRACKING SOSNEADO CRUDE, PROPERTIES OF CRACKED GASOLINE AND RESIDUUM

Untreated gasoline:	
Gravity, °A.P.I.	54.7
Sulfur, %	0.37
Gum, mg./100 ml. (copper dish)	164
Octane No. (research)	80
100 ml. A.S.T.M. distillation:	
I.b.p., °F.	100
10%	151
50%	274
90%	370
E.b.p.	398
Residuum:	
Gravity, °A.P.I.	3.3
Flash (Pensky-Martens), °F.	230
Viscosity, Furol at 122° F., sec.	2,594
Cold test, °F.	75
I.b.p., °F.	484
Distilled over, %	75
Coke, % by wt.	25.0

TABLE 15 — CRACKING SOSNEADO CRUDE, TREATMENT OF CRACKED GASOLINE AND PROPERTIES OF PRODUCT

Acid, lb. per bbl.	10
Treating loss, %	7.0
Treated gasoline:	
Gravity, °A.P.I.	53.3
Color, °Saybolt	22
Color stability	14
Sulfur, %	0.16
Gum, mg./100 ml. (copper dish)	18
Octane No. (research)	79
100 ml. A.S.T.M. distillation:	
I.b.p., °F.	110
10%	160
50%	270
90%	368
E.b.p.	394
Distilled over, %	97.5
Bottoms, %	1.0
Loss, %	1.5

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3. Eby, J. Brian, Oil Weekly, 113, 7, 14 (1944)).
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Otto Koch was reelected chairman of Kendall Refining Co. at the annual meeting of directors in Bradford, Pa. Other officers chosen: **J. Betram Fisher,** president; **Joseph H. Bovaird** and **Don T. Andrus,** vice presidents; **S. J. Brill,** secretary; **H. W. Jackson,** assistant secretary and assistant treasurer.

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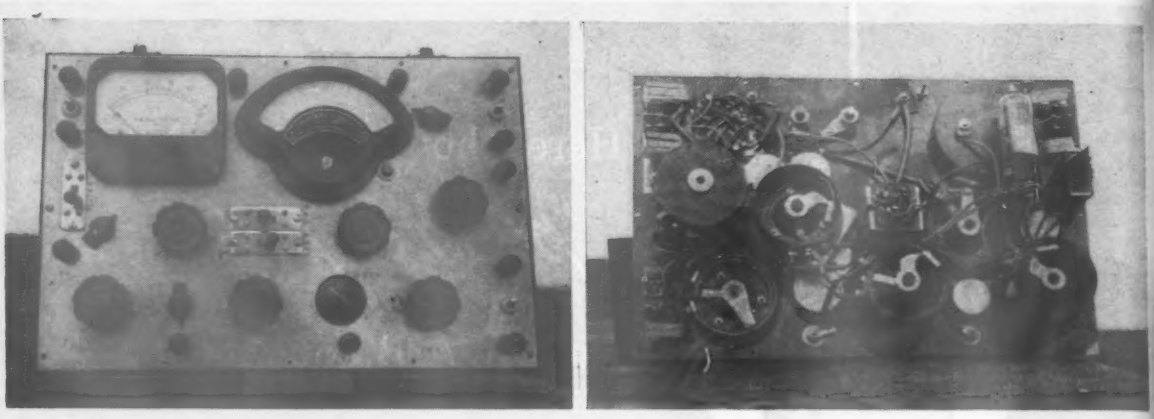

Fig. 1: Outside and inside of cathodic-protection apparatus built at National Bureau of Standards

Recent Progress in the Mitigation of UNDERGROUND CORROSION

by Kirk H. Logan*

This paper describes briefly the progress in the mitigation of corrosion during the past 2 years. Methods and apparatus for scientifically determining the amount of current required for cathodic protection have been developed. Field investigations show that zinc anodes remain effective throughout their life. Tests of coatings on 1-year-old pipe lines indicate that it is possible to lay coated lines with less than one holiday per mile. A new and more effective holiday detector has been developed.

The author is employed by National Bureau of Standards, and has made an exhaustive study of soil corrosion and its mitigation. A graduate of University of Kansas, he undertook graduate work at Kansas A. & M. College, and followed the teaching profession for several years.

CORROSION research has been retarded by the war. Many research men are in the service, materials have been scarce and the supply of apparatus restricted. The delaying effect of the war is illustrated by the fact that the results of the examination of soil-corrosion specimens removed by the National Bureau of Standards in 1941 will appear in the September 1944 number of the Journal of Research.[1] The above-mentioned report deals with attempts to produce more corrosion-resistant materials. The additions of small percentages of copper, nickel, or chromium tends to reduce the rates of loss of weight of ferrous alloys, probably because of the formation of protective films. These films are seldom continuous and their breakdown results in large cathodic and small anodic areas with accelerated pitting. The rate of penetration is reduced only when a large percentage of alloying material is used. The report contains the first data on asbestos-cement pressure pipe. After 4 years' exposure to a variety of acid and alkali soils, this material showed slightly greater bursting and crushing strength than the unexposed specimens of the same material, probably because the cement underwent a curing process when exposed continuously to the moist soil. Copper and alloys high in copper were much more resistant to all soils than any of the ferrous alloys except the high-nickel-chromium-iron alloys.

Interest in corrosion has been sustained in spite of handicaps imposed by the war. In the spring of 1943, the National Bureau of Standards held its fifth 3-day soil-corrosion conference in St. Louis. Attendance was limited to authors of papers, of which 47 were presented. Twenty-three of these papers dealt with cathodic protection. Corfield is editing a series of extended abstracts of these papers published in Gas. The National Bureau of Standards conference was followed, 2 months later, by the first convention of the National Association of Corrosion Engineers. This 3-day convention, held in Houston, was attended by approximately 200 men and women. Thirty-five papers were presented and discussed. In both of these meetings, cathodic protection was a prominent topic but many other topics received consideration. Much of what is reported in this paper was discussed at these meetings or is the outgrowth of suggestions originating there.

Substitute Materials Speed Corrosion

Interest in corrosion has been maintained probably because corrosion continues and is accelerated by the use of substitute materials. The National Association of Corrosion Engineers, whose first convention has been mentioned, is the outgrowth of the cathodic protection section of the Petroleum Industry Electrical Association but has much broader aims and membership. Enrollment in the new association is now about 260. Almost simultaneously, the Electrochemical Society has organized a corrosion section, the enrollment in which is approximately 200. The section has undertaken to publish a handbook on corrosion. The table of proposed contents indicates that "encyclopedia" would be a more appropriate name. The material for the handbook will be prepared by about 90 of the best-known specialists on corrosion and few phases of corrosion problems will be overlooked. The National Bureau of Standards has under way the preparation of a circular on underground corrosion

*National Bureau of Standards, U.S. Department of Commerce.

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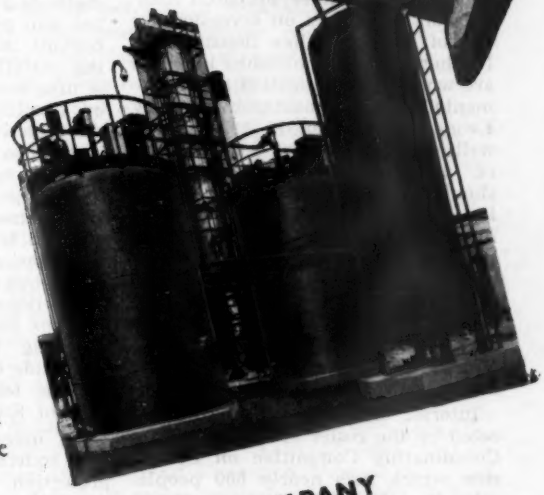

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Fig. 2: Rods removed after 4 to 6 years' service

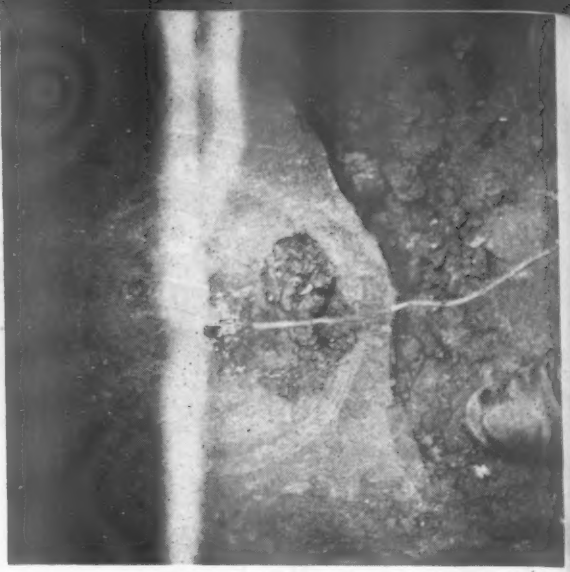

Fig. 3: Corrosion products from anode migrate into soil

in which the more important data accumulated by the bureau since 1922 will be assembled and interpreted. Two public utility organizations, Ebasco Services and Shell Pipe Line Co., have prepared manuals or handbooks on corrosion for use of their pipe-line departments. Neither has been published but both are worthy of publication as supplements to the books published by Ewing and Larson in 1938. These writings and the more technical one of the Electrochemical Society should be of great assistance to novice corrosion engineers and others interested in corrosion, but they cannot provide the experience and understanding necessary for the solution of the more important corrosion problems, and those having such problems will still do well to employ a competent engineer to solve them.

Interest in corrosion is also indicated by the roster of the American Coordinating Committee on Corrosion which lists nearly 500 people actively interested in some phase of corrosion. The purpose of the committee is to assist corrosion research by showing where information can be obtained.

Cathodic Protection

Cathodic protection has largely been an art rather than a science. Several years ago Ewing[2] pointed out some of the weaknesses of current practices in cathodic protection. In 1942 Pearson[3] following suggestions by Ewing, McRaven, and Evans, described a more scientific method of determining when a pipe is protected. Hadley, Smith, Denison, and the writer[4] made Pearson's[5] laboratory experiments applicable to pipe lines. The method referred to is probably applicable only to pipe lines on which the corrosion is controlled by the polarization of the cathodic areas. Fortunately, this is the usual condition of corroding ferrous pipes.

The Pearson method of determining when a section of pipe is protected is more complicated than the methods in more general use and its use will probably be limited to important installations and to checking installations based on changes of pipe potential. The Pearson method furnishes a means of studying the effectiveness of protective coatings since the current required to protect a section of pipe is controlled to a large extent by the exposed area of metal. The method can also be used to determine the intensity of corrosion at a given point since the protective current is equal or proportional to the corrosion current, as has been shown by Denison.[6] Fig. 1 shows the outside and the inside of cathodic-protection apparatus built at the National Bureau of Standards.

An investigation of zinc anodes as a source of current for cathodic protection, sponsored by the National Association of Corrosion Engineers and conducted by Wahlquist in Colorado, indicated that in sulfate-containing soils, zinc anodes continue to furnish current until consumed or disconnected. The amount of current will, of course, depend largely on the resistance between the rod and the soil. Fig. 2 shows some rods removed after 4 to 6 years' service. Fig. 3 shows how corrosion products from an anode migrate into the soil. The outside ring is about 12 in. in diameter. The rods investigated by Wahlquist were 4 ft. long and 1⅜ in. in diameter and furnished from 21 to 46 milliamperes each after about 6 years. Mudd recommends zinc cylinders, 6 in. in diameter made from sheet zinc. Both Mudd and Wahlquist recommend surrounding zinc anodes with calcium sulfate (gypsum).

Wahlquist is engineering a very interesting application of cathodic protection to a large gas line in the streets of a southern city. The line is coated, Dresser-coupled, steel. Current is supplied by a series of zinc plates placed one over the other in holes 15 to 18 ft. deep adjacent to the pipe line. The groups of anodes are spaced at sufficient intervals to lower the potential of the pipe the desired amount. Because of the coating on the pipe, a single anode group will protect several hundred feet of pipe. The zinc-anode method of applying cathodic protection does not endanger adjacent pipes or cable sheaths and requires no expensive transmission system to distribute the current.

The use of zinc anodes is limited by the low difference of potential between zinc and iron. Where higher potentials are required, magnesium has some consideration. Olson reports that tests conducted by him indicate that the magnesium anodes used were subject to serious local galvanic corrosion. Research is under way to reduce this corrosion.

A southern chemical company is considering cathodic protection to reduce the corrosion of iron cooling coils over which sea water is sprayed. Farther north, an engineer is considering cathodic protection for well casings which are corroding rapidly. Since the casings traverse strata differing widely in conductivity, the problem of maintaining a satisfactory distribution of current is an interesting one.

The efforts of Hadley[7] have called attention to the importance of sulfate-reducing bacteria as a cause of underground corrosion. The hydrochloric acid test for the presence of sulfides in corrosion products is so simple that any one can test for sulfides when corrosion products are available. The writer discovered on a trip to Colorado that the test was unreliable when used on products

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The oil industry has developed many new processes to refine crude oil and petroleum gases into various petroleum products, and also to transform some of those products, such as butane and butylene, into still other products. The alkylation unit illustrated in the large view at the left is a typical example of the type of equipment required for one of these processes first used only a few short years ago.

All of the refinery towers in this alkylation unit, as well as the ones in the other two views, were fabricated at our Birmingham plant. The ten alkylation towers were stress-relieved and all but one of them were x-rayed. The debutanizer tower was stress-relieved while the 10 ft. diam. drum in the center view was x-rayed only.

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near a leak on a natural-gas line. The gas contained enough hydrogen sulfide to give a reaction when soil contaminated by leaking gas was treated with acid. The American Gas Association[1], through a research associate at Rutgers University is developing appartus to determine the aeration of soil or water at the bottom of a small test hole. Since the sulfate bacteria are anaerobes they can be expected to be active only in nearly neutral, oxygen-free soils. The apparatus will make it possible to locate places along a right-of-way which are subject to corrosion by sulfate-reducing bacteria before a pipe line is laid.

The corrosion meetings referred to are responsible for the release of some new data on pipe coatings. Kelly reported that half of the steel pipe lines in the United States were coated and that 80 per cent of these coated lines were coated with coal-tar-base material. Hugo reported that the Pearson holiday detector indicated 80 current leakage points in 150 miles of 1-year-old asphalt-mastic-coated line. Some of these points could not be located by visual inspection. A similar test of 45 miles of coal-tar-enamel coating of about the same age indicated 36 current discharge points. These records indicate a marked improvement in the application of pipe coatings. Repetitions of the test at intervals of a few years would show whether there was any deterioration in the coatings.

Stearns[9] has developed a holiday detector for use on a coated pipe line about to be placed in the trench. The presence of a holiday is indicated by the flashing of a colored light and the ringing of a bell and holidays are counted automatically. The skipping of a holiday seems improbable and the applied voltage is not only kept low but is cut off after a brief period. The apparatus should be of great assistance in the production of a continuous coating.

One of the larger pipe-line companies is experimenting with fiberglass as a shield or reinforcement for bituminous coatings. A trial of this material applied in several ways and exposed to several soil conditions should establish its value as a part of a coating.

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Determination of Gum Content Of Diesel Fuels

WITH the increasing use of cracked fuels, especially catalytically cracked fuels in diesel engines, with the increasing complications in operations and performances introduced by the peculiar properties of these products, the desirability of a standardized test method for determination of gummy substances and their formation tendencies has become more apparent. A "tentative standard" test method has been developed by L. W. Dickey and Roy Henry, Standard Oil Co. of California at Richmond, the details of which are given below.

Apparatus and Procedure

Apparatus consists of an Erlenmeyer flask, capacity 50 ml. condenser, Liebig type, water-cooled with adapter, preferably sealed on; filtering flask, capacity 1 liter; oil bath; source of inert gas (natural, artificial, nitrogen, carbon dioxide); vacuum pump.

Transfer 25 ml. of the diesel fuel to a tared 50-ml. Erlenmeyer flask. Connect the flask to the condenser and to the source of inert gas by means of a cork stopper fitted with two glass tubes the ends of which are flush with the bottom of the cork. Attach the filtering flask to the condenser adapter by means of a rubber stopper and connect the side arm of the flask to a source of vacuum. Apply a vacuum of 50 to 55 cm. (20 to 22 in.) of mercury to the assembly and pass gas into the system at a rate of approximately 250 ml. per minute.

Immerse the flask in an oil bath heated to that temperature at which the sample will be evaporated practically to dryness in 45± 5 minutes. (This temperature will generally be 150° F. below the 90 per cent point of the A.S.T.M. D158 distillation). At the end of the specified time increase the bath temperature 50° F., and increase the rate of gas flow to approximately 500 ml. per minute. Maintain these conditions for 10 to 15 minutes; then remove the oil bath, shut off the vacuum and increase the flow of gas until the pressure in the system is approximately atmospheric.

Disconnect the tared Erlenmeyer flask, add 25 ml. of a mixture of equal parts of carbon tetrachloride and acetone to the flask, and evaporate to dryness on the steam bath. Connect the flask to the condenser as before, again apply the vacuum and with the gas flow and temperature as previously established for the end phase of the evaporation heat the flask for approximately 15 minutes. Disconnect the flask as previously described, clean the outside thoroughly and weigh.

Mg. gum per 100 ml. = mg. gain in weight × 4.

In studying the different variables in this empirical test to determine the best conditions to employ it was found that by varying temperature to fit the sample, the 20-22 in. of mercury vacuum was adequate to evaporate the sample in less than an hour, with little chance for collapsing the hot flask. The period of 1 hour evaporation time is arbitrary and experience may dictate another. The other variables were selected after trial and error methods were employed and appear to be reproducible, the test's originators believe. Re-solution of nonvolatile residue in the acetone-CCl_4 mixture eliminated error due to a fraction of oil being held in the residue because of a "skin" of nonvolatile gum retaining the oil and preventing complete evaporation in the first instance. This second step renders the results reproducible on the samples tested by the originators of the test method.

For an accelerated test to show the tendency of fuels to form gum in storage, Dickey and Henry propose the same test as that used by the U. S. Government on aviation fuel. This test is carried out in a bomb under 100 lb. oxygen pressure and at 212° F., with a catalyst. These experimenters used iron and brass, inserting about 100 sq. cm. of metal surface in each test, of both metals. Five hours was the time for the test, using 200 ml. of sample in an 8-oz. sample bottle.

It was found that the regular test method given above in detail shows reproducible results even with sample as high as 1,400 mg. of gum per 100 ml. of sample, and its originators believe it will give a satisfactory method for showing dissolved gum in diesel fuels. (Additional discussion is found in Analytical Edition, Industrial and Engineering Chemistry, Vol. 16, Nov. 1944.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

W. L. NELSON

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

Cleaning of Exchangers With Chemicals

Our gasoline condenser exchangers having red-brass tubes are badly corroded or rather covered with scale on the outside. Without removing the tube bundles from their present location we would like to clean both the outside and the inside. Can you suggest a chemical for the job?—O.B.B.

Various chemicals have been used or proposed for such cleaning work. Inhibited dilute hydrochloric acid has been used to remove lime-rich water scales and for loosening certain other scales, but alkaline chemicals are used for most other situations. The kinds of solvents or chemicals employed may be grouped as:

1. Solvents for removing the last traces of oil or asphalt, and to loosen some gum or varnish-like deposits so that other types of cleaning agents can be employed.

2. Acidic chemicals such as hydrochloric acid for removing or loosening alkaline deposits such as water scales that are rich in lime. Obviously, inhibitors must be employed to keep the acid from attacking the metal of the equipment, and great care must be taken that the proper strength and kind of acid is employed.

3. Alkaline chemicals such as caustic soda mixed with other materials for loosening carbonaceous, resinous, or some water scales. Such chemicals are often used hot and sometimes are allowed to stand for several hours before circulation.

4. Dilute chemicals or water conditioners which are used in the cooling water to kill algae or to keep scales from being deposited.

Although different systems are required for different situations a widely used hookup is shown in Fig. 1. It involves circulation tank for the accumulation of sediment. Provision should be made for sediment in both tanks. Connections and valves are provided for reversing the direction of flow. Reversal of flow is said to greatly reduce the time of treatment required. Connections are provided for blowing with steam or for heating the chemical solution. Heat is also sometimes supplied by sending steam through the tubes of the exchanger while the shell is being cleaned or vice versa.

So many different kinds of deposits may be encountered, as well as several kinds of metals, that commercial companies should be consulted regarding the cleaning job. In many instances the exchanger should be opened and examined before starting the chemical treatment. After having established the type of scale that is involved and the procedure of cleaning it may be unnecessary thereafter to open the exchanger.

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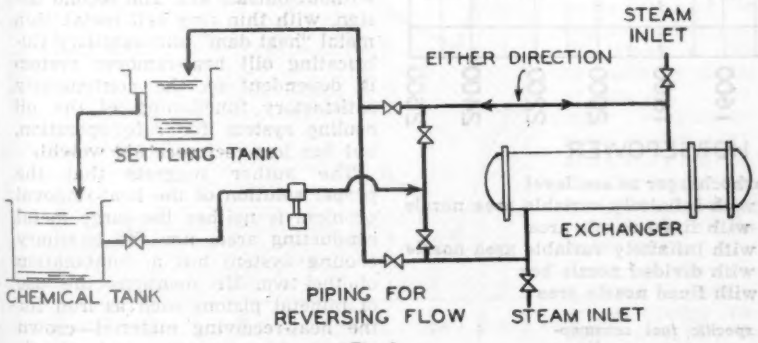


Fig. 1

Properties of 1,3 Butadiene

We have seen somewhere a list of the properties of butadiene, but we can't locate them. Can you direct us to them?—P.A.C.

The physical properties of butadiene have been presented in many places, notably, Research Bulletin No. 7.381-B, "The Storage of 1:3 Butadiene," of the Mellon Institute of Industrial Research; and Wood & Higgins, Refiner, page 89, March 1943. Numerous supporting references are given by these authors.

PHYSICAL PROPERTIES OF BUTADIENE

Mol weight	54.088
Sp. gr. referred to air	1.877
Boiling point, °F.	23.5 - 23.7
Latent heat, B.t.u./lb.	174.7 -179.6
Inflammability limits, vol. per cent in air	2 to 11.5
Melting point, °F.	—163.7 to —164.0
Heat of fusion, B.t.u./lb.	63.4
Critical temp., °F.	325.7
Coeff. of expansion between —5° F. and 70° F.	0.001022

Sp. gr. referred to water at 60° F.—

at 0° F.	0.662 -0.6688
24° F.	0.6473
32° F.	0.6425
60° F.	0.6263-0.6273
70° F.	0.6205
100° F.	0.6023-0.5994
140° F.	0.5780-0.5688

Sp. ht., B.t.u./lb. gas at—

24° F.	0.308
60° F.	0.332
100° F.	0.356

Liquid at—

24° F.	0.518
60° F.	0.551
70° F.	0.560
100° F.	0.588

Vapor pressure, lb./sq. in. abs. at—

—100° F.	0.35
—50° F.	2.00
0° F.	8.00
32° F.	17.64
70° F.	37.74
100° F.	64.7
140° F.	114.7

Heat of combustion, B.t.u./lb. 19,899

Density, lb./gal. at—

0° F.	5.55
20° F.	5.445
40° F.	5.333
60° F.	5.221
80° F.	5.101
100° F.	4.988
120° F.	4.862
140° F.	4.733

S.A.E. ABSTRACTS

Here are published abstracts of four of the papers that were presented at the annual meeting of the Society of Automotive Engineers, at Detroit, January 8-12.

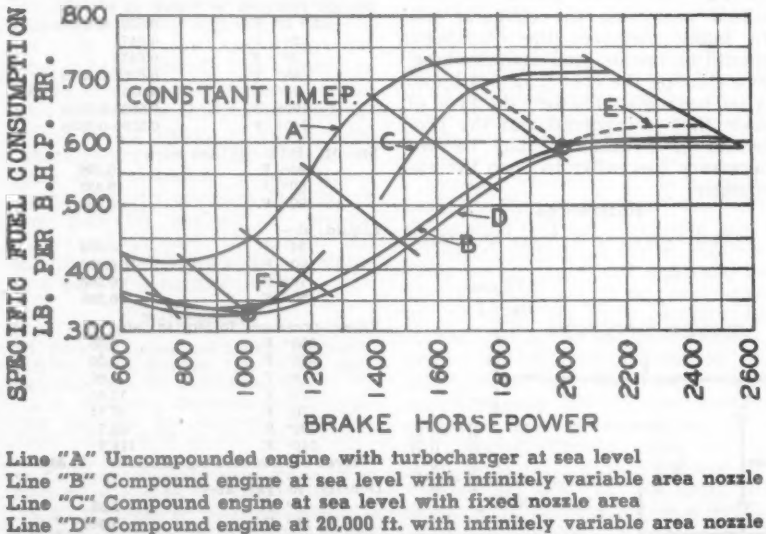
Turbines Plus Piston Engines

C. F. BACHLE, vice president, Continental Aviation & Engineering Corp.

GREAT possibilities exist for the piston engine compounded with a gas turbine. This arrangement conducts the exhaust from the regular explosion cylinders direct to a turbine built integrally with the piston part of the system. This general idea is already applied widely in exhaust-driven turbosuperchargers for aircraft engines to improve their high altitude performance, and also in diesel engines to improve their efficiency and specific power output. In this arrangement, however, the supercharger does not absorb all the potential power from the exhaust gases since energy is still available in those gases; this energy can be used to produce greater total power output from a given fuel consumption by gearing the turbine to the engine driving mechanism, such as the crankshaft or the gear train to the propeller shaft and utilizing the additional power delivered to the main driving unit or mechanism.

With a maximum exhaust gas temperature of about 1,600° F. at present—and a possibility of up to 1,900° F. in future—a temperature differential of about 300° F. between exhaust gases and exhaust pipe metal can be maintained and a pressure differential between gases and outside or back pressure of about 18 p.s.i. By improving the temperature differential and thus the pressure difference to 23 p.s.i. the power available in the exhaust gases at 20,000 ft. elevation is 47 per cent of the piston engine power at sea level; at sea level the turbine gives 33 per cent of additional power with the same pressure differential. These figures do not take into account losses due to back pressure of the exhaust gases on the piston division of the compound power plant. In an assumed case a piston and turbine compounded engine shows an over-all thermal efficiency of 41 per cent at cruising speed at 20,000-ft. elevation, and only 31 per cent thermal efficiency under the same conditions with no turbine included, these data being correct and calculated for 70 per cent turbine efficiency.

Specific fuel consumption is improved greatly by the addition of the turbine auxiliary, the author states. With an uncompounded aircraft engine—that is, no turbine—the specific fuel consumption in pounds per horsepower per hour at 1,600-2,000-hp. output at sea level is about 0.72. Compounded with a turbine with infinitely variable area nozzle this figure is reduced to 0.48 at 1,600-hp. output, 0.59 at 2,000-hp. output, at sea level. At 20,000-ft. elevation these consumptions are reduced to 0.44 at 1,600-hp. output, 0.56 at 2,000 hp. Considerable advances may be expected in future along this line of progress, the author appears to believe.



Line "A" Uncompounded engine with turbocharger at sea level
Line "B" Compound engine at sea level with infinitely variable area nozzle
Line "C" Compound engine at sea level with fixed nozzle area
Line "D" Compound engine at 20,000 ft. with infinitely variable area nozzle
Line "E" Compound engine at sea level with divided nozzle box
Line "F" Compound engine at 20,000 ft. with fixed nozzle area

Relative power output and specific fuel consumptions of compounded and uncompounded power plant

New Piston Developments

E. T. VINCENT, University of Michigan.

TWO general methods are employed in piston design to eliminate heat from the cylinder crown and thus improve performance, and lessen the severity of conditions on fuel, lubricating oil and engine in general. One method is by the use of heavy crowns and side walls in pistons, which serve in the case of the side walls especially, to conduct the combustion heat away from the crown to the piston wall and thence to the cylinder wall where it is dissipated by the cooling medium. In the second design the "ring belt" and grooves are connected to the piston crown by means of a relatively very thin metal section which acts as a dam against transfer of heat from crown to the ring belt metal which itself is decidedly thin compared to the first design mentioned above. The heat thus dammed up in the crown is removed by directing a stream of lubricating oil against the under side of the crown. This latter method places the burden of cooling on the lubricating oil, which in turn is exposed to the deleterious high temperatures and thus deteriorates more rapidly. The first design places more reciprocating weight in the piston which in itself is undesirable.

The first design is a law unto itself so to speak, and will continue to operate at a safe, relatively low temperature until the conditions exceed in severity those for which the piston is designed, all without outside aid. The second design, with thin ring belt metal, thin metal "heat dam" and auxiliary (lubricating oil) heat-remover system is dependent on the continuously satisfactory functioning of the oil cooling system for safe operation, but has less reciprocating weight.

The author suggests that the proper solution of the heat-removal problem is neither the large metal conducting area, nor the auxiliary cooling system but a combination of the two. He mentions the use of bimetal pistons such as iron for the heat-receiving material—crown surface for example—and alumi-

num alloy as the heat transfer and disposal metal. Iron receives heat less rapidly than does aluminum, while the latter transmits heat more rapidly to surroundings such as cylinder walls.

Experimental data reported last May in Chicago indicate that lower temperatures for rings and pistons, as well as reduced blowby follow as a result of reducing the width of the ring in contact with the cylinder wall. Summing up the data available in this field, the author urges that a committee of the S.A.E. should be appointed which would direct cooperative research looking toward a solution of the fundamental problems involved in the field, vital to both engine designer-user and the fuel and lubricant manufacturer. Published knowledge of these fundamentals is very inadequate and leaves much to be desired, he says; the technique of measuring piston temperatures has advanced to the point where he believes it can be used successfully in determining these fundamental factors.

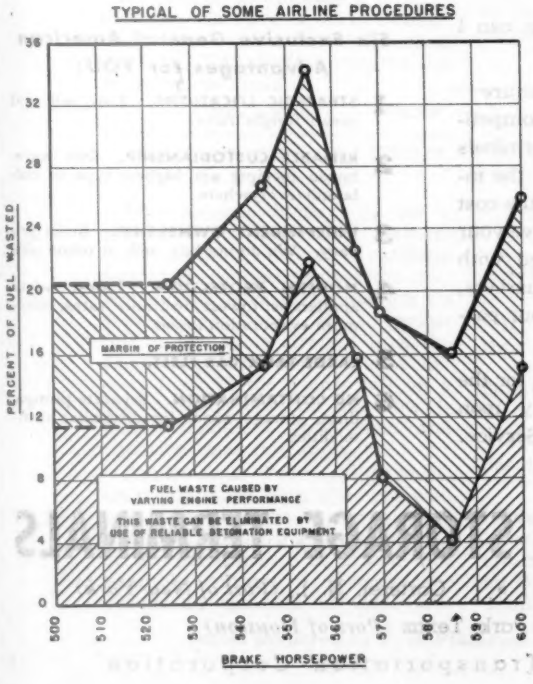
Effect of Detonation on Fuel Consumption And Engine Life

P. J. COSTA, Sperry Gyroscope Co.

ACCURATE determination of knock in flight, in testing performance and operation of aviation engines has been made practicable by development of the M. I. T.-Sperry detonation equipment for studying this phenomenon, this author points out. Results in brief show that the extra-rich-mixture type of operation required in many cases to prevent severely damaging detonation in airplane engines may be eliminated by proper mixture control with this equipment, an operation not heretofore possible in practical flight operations.

To study this problem the equipment was installed on one company plane, on one of two engines. The plane is a twin-engined Lockheed-Hudson; the engine is a Wright Model GR1820-G102A, which was overhauled immediately before the test began. Spark advance was set at 15° to 20° B.T.C.; compression ratio, 6.3 to 1; single-stage supercharger; propeller reduction, 16 to 11; fuel, 91-octane number. Without describing in detail the system, the detonation pickup is described as being attached to the outside wall of the engine cylinders, and which transforms the cylinder-head vibrations into electrical impulses which are amplified and transmitted to a neon glow tube which glows when the detonation intensity exceeds some standardized value.

The results of a large number of flight tests indicate that fuel consumption can be reduced appreciably by operating the engine at light detonation. The rate of detonation known as "trace knock" shows only the slightest effect on engine life. Domestic airlines and military operations are wasting as much as 20 per cent of the fuel consumed under some flight conditions. After operating under detonating conditions for more than 100 hours, no unusual wear or damage to the engine was noted, when the frequency of detonation varied between 1 and 40 per minute.



These researchers found that in flight no detection of detonation can be made by means of the No. 1 cylinder temperature gage, engine operating roughness, the Cambridge fuel analyzer or any combination of the three indicators. Some of the abnormal oscillograph images obtained with M. I. T.-Sperry detonation equipment have been identified with faulty engine operation. It is determined that it is impossible to provide engine operation at maximum economy, based on cruising curves from a known fuel, because of the changes in engine at surrounding conditions, changes in fuel status during flight, and the practical inability of refiners to provide fuels of uniformly exact properties and specifications at all times.

An interesting observation on the effect of type and metal composition of rings employed in the engine is that, prior to one division of the test program, one chromium-plated compression ring was placed in each cylinder. After 100 hours of light detonation operation the regular rings were all feathered; the chrome-plated rings showed no signs of feathering, which evidence shows that the type of ring and not the detonation conditions control ring feathering results.

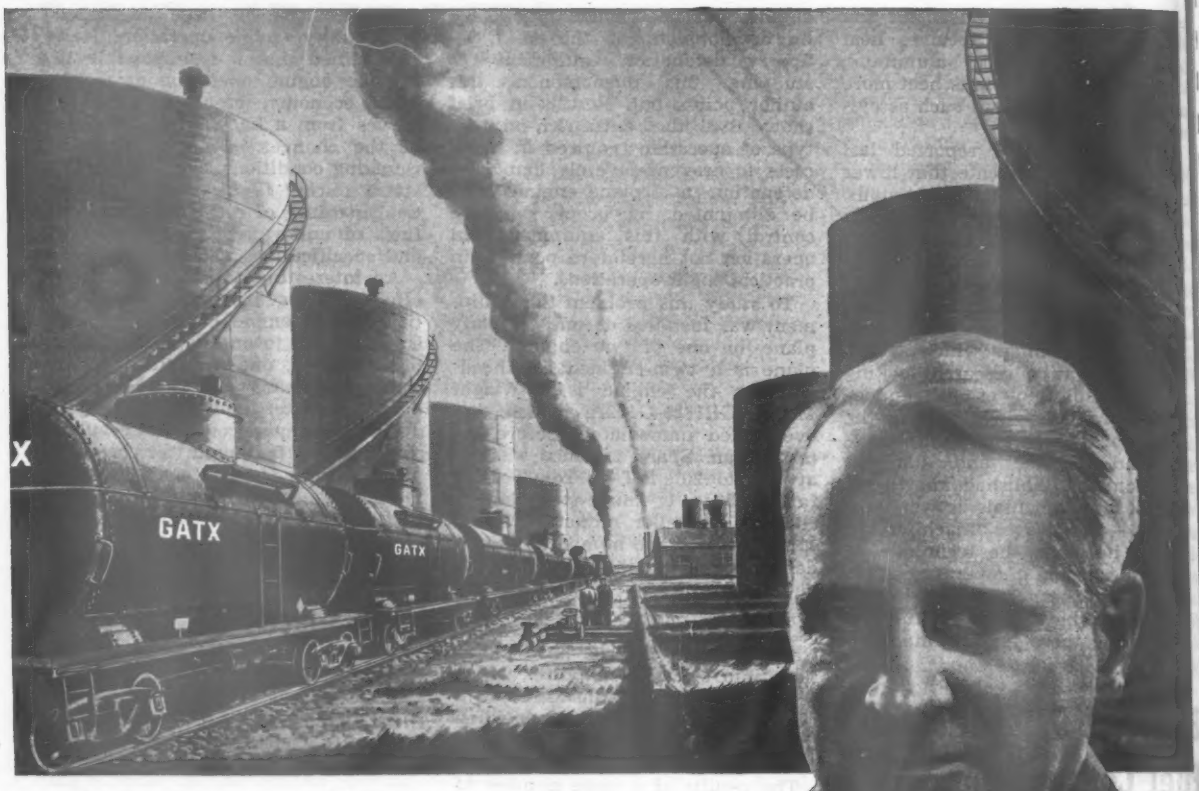
High-Speed Motion Pictures

RICHARD PAINTER and PAUL HUBER, General Motors Proving Ground.

SPEEDY as picture-taking equipment is now, as used in research problems on especially things mechanical, the cameras used for this purpose are too slow for many purposes, these authors state. Their speed of 8,000 frames per second, now maximum, is too slow for many automotive engine research jobs. We need cameras showing speeds up to 20,000 frames (exposure) per second to investigate the fundamentals of many automotive and similar problems.

One of the earliest and simplest of high-speed cameras was built by General Electric Co. in 1939, using no lenses but merely pinholes through which impressions of objects were transmitted to a film. Its application was too limited to be of the most service, although the absence of lenses made for mechanical ruggedness, and the use of a series of small "cameras" enabled exposures to be made at the rate of 120,000 frames per second. This camera could not produce picture sequence which could be synchronized to show motion.

The present types of speed cameras use generally a rapidly rotating prism, with speeds up to 60,000-90,000 r.p.m., and make up to 8,000 exposures per second. High light intensity is needed, which is obtained, for example, by stepping up voltage on regular silvered 110-volt bulbs by 60 to 90 per cent, in which operation the bulb life is reduced to about 1 hour.



When you're looking ahead, it's well to know what's behind you

Now, in your planning, is the time to ask yourself, "What can I count on in the Present, to back me firmly in the Future?"

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Application of Radial Permeability To Oil-Reservoir Problems

PERMEABILITY of the formation completely penetrated by a well may be calculated by the same formula discussed in the last week's Engineering Fundamentals (No. 167), by measuring rate of flow and other factors, then solving the flow equation for K. The permeability of the sand is as follows:

$$K = \frac{\mu \cdot Q \cdot \log_e (r_1/r_2)}{2\pi \cdot t \cdot (P_1 - P_2)}$$

where K = permeability in darcies; μ = viscosity in centipoises; t = thickness of sand in centimeters; r_1 = radius of drainage area in feet; r_2 = well radius in feet; P_1 = pressure of the reservoir in atmospheres; P_2 = bottom-hole pressure of the producing well in atmospheres; Q = rate of flow of the oil in cc. per second. Example: Suppose a well is flowing at the rate of 266.4 bbl. per day (or 492 cc. per second) under the following conditions: Thickness of sand is 10 ft. (306 cc.); radius of hole is 0.3 ft.; drainage area is 500 ft.; static reservoir pressure is 1,275 p.s.i. (87 atmospheres); bottom-hole pressure of the well is 1,000 p.s.i. (68 atmospheres) at aforegoing producing rate; viscosity of oil is 1 centipoise. The natural log of the ratio 500/0.3 is 7.42. Substituting in the equation, we have:

$$K = \frac{1 \times 492 \times 7.42}{2 \times 3.1416 \times 306 \times 9} = \frac{3650.64}{17303.93}$$

$$= 2.11 \text{ darcies}$$

This formula holds only for a steady, streamlined flow. Several bottom-hole pressure readings should be plotted against the corresponding rates of production on cross-section paper. If the points fall on the same straight line, the production is for conditions of viscous flow. If the points fall on a curve, then some of the flow is under turbulent conditions, and equation does not apply.

Application.—Permeability measurements made soon after the well has been brought in serve as a means of measuring the efficiency of the performance of a well. For example, suppose it is desired to obtain an estimate of total production of a well, and suppose that one does not wish to carry out usual pressure-buildup methods of calculating productivity indexes. If one knows the reservoir permeability and measures the difference between the bottom-hole flowing pressure and the reservoir pressure (ΔP), the productivity of the well can be estimated by applying the radial permeability formula, according to the method described in last week's installment.

Calculating effect of size of hole on productivity of a well.—Many operators inquire how much the doubling or trebling of the size of a hole will increase production of a well, other conditions remaining the same. This question can be estimated quickly by applying the radial-flow formula and by substituting the radius under question for the present radius. For example, suppose a well has 100 ft. of coarse Trinity sand; a pressure differential of 1.77 atmospheres; permeability of 3 darcies: oil viscosity of 1 centipoise, and is finished in the sand with a diameter of 12 in. In the hole is increased in diameter from 12 in to 36 in., what will be the increase in production? Solution for a 12-in. hole is as follows:

$$Q = \frac{K \cdot 2\pi \cdot T \cdot \Delta P}{\log_e (r_1/r_2)}$$

$$= \frac{3 \times 6.2832 \times 100 \times 1.77}{1 \times 2.3 \times 3.301}$$

$$= \frac{3336.38}{7.59}$$

= 439.44 cc. per second = 239 bbl. per day.

If the hole is increased to 36 in., then

$$Q = \frac{3 \times 6.2832 \times 100 \times 1.77}{1 \times 2.3 \times 2.824} = \frac{3336.38}{6.5}$$

= 513.66 cc. per second = 278.4 bbl. per day = 16.5 per cent increase in production.

Discussion.—An opportunity occurred recently to test these calculations against actual wells drilled by the United States Army in the Trinity sand in Central Texas. The wells were first drilled to 8 in. in diameter, flow tests were made, and then the wells were reamed to 16 in. The actual increase in production was in quite close agreement (only 4 per cent greater) with the theoretical amount calculated by means of the radial-flow formula.

The increase in productivity of Edwards limestone wells and West Texas Permian limestone wells, due to an increase in the diameter of the hole by reaming and dissolving limestone in the acid-treatment process is, in many cases, several times the amount calculated by the radial-flow formula where the diameter of the holes has been measured by bottom-hole calipers. This is thought to be due to the fact that much of the flow of oil through limestone is through tiny crevice channels and not through connected pores. Crevices follow certain joint patterns. Enlarging a well opens up new passageways into the well and increases the number of streamlets coming into the hole. Since the crevice lines are not radially spaced, the radial-flow formula does not account for the full amount of new oil flowing to the well through a rectilinear system of joints (Fig. 1).

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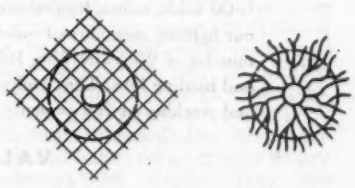
Wyckoff, R. D., Botset, H. G., Muskat, M., and Reed, D. W., Measurement of Permeability of Porous Media: A.A.A.G. Bull., vol. 18, No. 2.

Moore, T. V., Schilthuis, R. J., and Hurst, William, The Determination of Permeability From Field Data: A.P.I. Prod. Bull. 211, May 1933.



A B

Fig. 1: Patterns of drainage lines leading into an oil well. A. Radial drainage through sand or oolitic lime. Note that increasing size of the hole from dotted circle increases number of drainage lines reaching hole three times. B. Rectilinear drainage through prismatic joint pattern in fractured limestone. Note that increase in the size of the hole from solid circle to dashed circle increases number of drainage cracks reaching the hole five times. Drainage pattern plays part in well productivity

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Evaluation Curves

NOTEBOOK No. 24 on "Laboratory Crude Distillations" mentioned several types of distillation. Their real value lies in determining yields and hence additional laboratory data should be obtained on the fractions or cuts from the distillation, particularly A.P.I. gravity, octane-number, and sulfur content. Convenient methods of plotting such data in the form of curves are presented here so that the properties of any part of the crude oil can be evaluated. There are two or three main kinds of data:

1. Instantaneous, stream, differential, or mid per cent data—The property of the stream at any instant during the distillation is what is meant. Vapor temperature, gravity, octane-number and sulfur content are the most useful properties of topping plant products although color, aniline point, diesel index, pour point, etc., may also be determined and plotted in the form of mid per cent curves.

2. Cumulative, yield, integral, or summation data—These data represent the average properties of an accumulation of material such as the gravity of the gasoline extending from zero per cent (except loss) in the crude oil to the end of the gasoline which might be, say, 30 per cent. Obviously, different yields of gasoline would have different gravities and hence a complete curve of gravity related to percentage yield is required, and such a curve is called a gravity yield or a distillate-gravity-yield curve.

3. Residual yield data are entirely similar to the data of item (2) except that the property of the residue is plotted against the percentage of residue. Such curves are often called residual-yield curves, e.g., gravity-residual-yield curve.

TENTATIVE SCHEDULE OF TOPICS

The characteristics of crude oils were discussed in:

No. 9. September 16—Mixed Base.
No. 11. September 30—Paraffin.
No. 13. October 14—Naphthene.
No. 15. October 28—Aromatic.
No. 17. November 11—High Sulfur.
No. 20. December 2—Comparison.

Methods of analyzing crude oils (Nos. 24, 26, 29, 31, etc.) is being continued. Topping processing is also being discussed as in Nos. 19, 21, 22, 23, 25, 28, and 33, some of which are listed below:

No. 21—Symbols for Flow Diagrams.
No. 22—Hazards and Corrosion With Sour Crude Oils.
No. 23—Combination Topping Plants.
No. 24—Laboratory Crude Distillations.
No. 25—Straightrun Aviation Gasolines.
No. 26—Evaluation Curves.
No. 27—Cost of Topping.
No. 28—Processing Asphaltic Crudes.

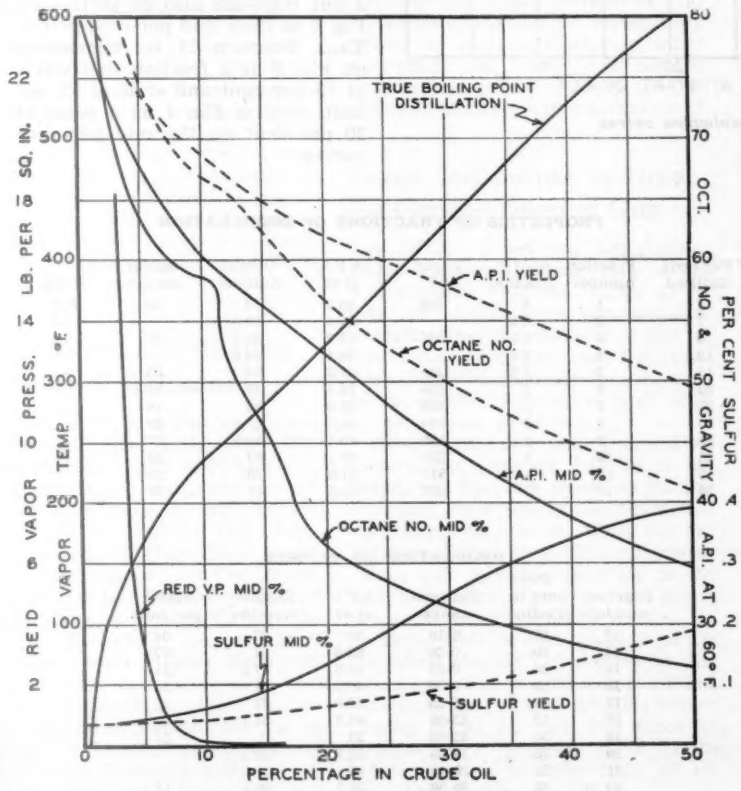

Fig. 1: Mid per cent and yield evaluation curves

Purpose of Plotting Curves

Data from a fractionating type or true boiling-point distillation are best but the data from any crude distillation can be plotted in the form of curves. The purpose of plotting such curves is to faithfully represent the laboratory data and hence no profound theory underlies the curves,—they are merely the method employed by the refiner to digest or make laboratory data most useful. The two main methods of plotting such information are shown with this discussion. The data shown in the tabulation entitled "Properties of Fractions" and "Properties of Blends" are plotted in the two main styles in Figs. 1 and 2. Notebook No. 31 on Realization will indicate the use of these curves.

In plotting Fig. 1, the data in the table entitled "Properties of

No. 26 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

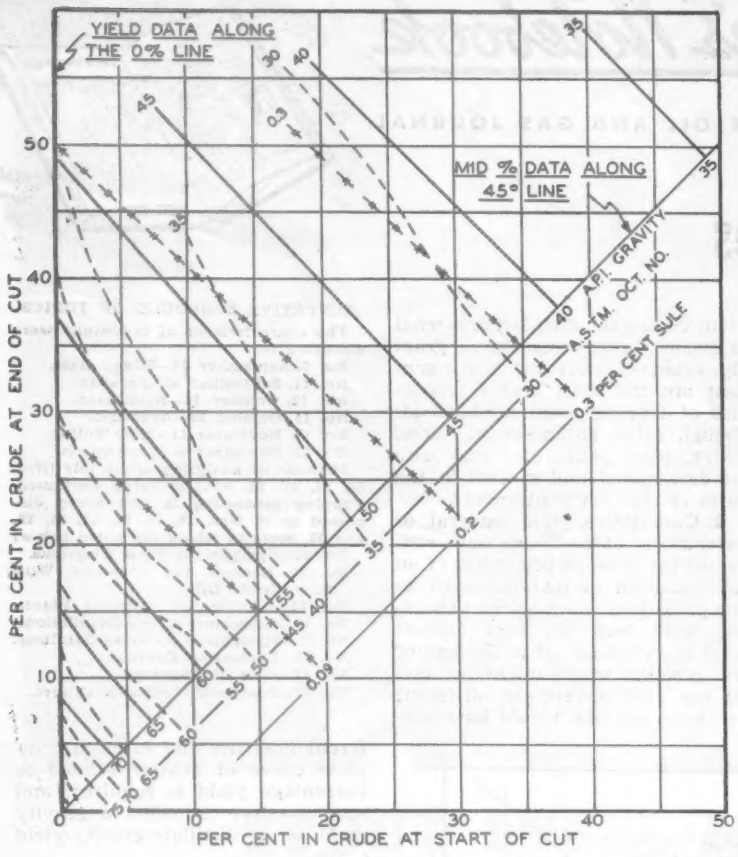

Fig. 2: Isoproperty evaluation curves

Fractions" were plotted as mid per cent curves. Thus, the A.P.I. gravity of Fraction 1 (73.5) was plotted at the mid per cent point of the fraction, i.e. at 2.5 per cent. Fractions 2, 3, 4 and 5 consisted of only 2.5 per cent each and hence the properties were plotted on the mid per cent curves at 6.25, 8.75, 11.25 and 13.75 per cent respectively. Thus, the octane number of Fraction 2 (61.5) was plotted at 6.25 per cent, and the R.v.p. of Fraction 3 (0.3) was plotted at 8.75 per cent, etc. If these curves show much curvature, the properties are not plotted at exactly the mid points of the fractions but for most plant work this refinement can be neglected. Refer to Petroleum Refinery Engineering, Second Edition, McGraw-Hill Book Co., Inc., for a more complete discussion of mid per cent and yield curves.

In Fig. 2, mid per cent data lie along the 45° line. This line indicates extremely small fractions, one so small that they cover no real range of percentage. Stated in another way, the mid per cent data represent the properties of the drop of material that is being collected at any moment or instant during the distillation. The curves can, nevertheless, be used to determine the properties of fractions which center about any point on a mid per cent curve because the properties of percentage distilling just ahead of a point on the curve is almost exactly balanced by the properties of an equal percentage of material that distills just after the point.

Plotting Yield Curves

Yield curves were plotted in Fig. 1 from Fractions 13, 14, 15 and 16 shown in the table entitled "Properties of Blends." A 10 per cent yield of gasoline (Fraction 13) has a gravity of 69, octane number of 67 and sulfur content of 0.04 per cent. These properties were plotted at 10 per cent on the three yield curves of Fig. 1 and the similar data of Fractions 14, 15 and 16 were plotted in a similar manner. The same data appear in Fig. 2 along the left vertical edge of the figure because this line indicates fraction, each of which start at zero per cent on the crude oil. The data of other blended fractions (17-23) are shown (only) on Fig. 2 but they can also be plotted on Fig. 1 at their mid per cent points. Thus, Fraction 17 is represented on Fig. 2 as a fraction that starts at 15 per cent and ends at 25 per cent, and on Fig. 1 as a point at 20 per cent on the mid per cent curves.

PROPERTIES OF FRACTIONS OF DISTILLATION

Per cent distilled	Fraction number	Per cent in fraction	Vapor °F.	A.P.I. at 60	Octane number	Sulfur per cent	R.v.p.
5	1	5	168	73.5	72	.04	24.6
7.5	2	2.5	...	65.6	61.5	...	1.6
10	3	2.5	235	62.0	59.1	.06	0.3
12.5	4	2.5	...	59.4	58.0	...	...
15	5	2.5	280	57.3	48.7	.08	0.1
20	6	5	329	54.4	40	.11	...
25	7	5	378	50.3	35	.16	...
30	8	5	429	46.5	32.5	.22	...
35	9	5	480	43.1	30.6	.27	...
40	10	5	529	40.1	29	.32	...
45	11	5	571	37.6	28	.35	...
50	12	5	607	35.5	27	.38	...

PROPERTIES OF BLENDS

Fraction number	Per cent in fraction	Per cent range	A.P.I. at 60	Octane number	Sulfur per cent
13	10	0-10	69	67	.04
14	20	0-20	62.3	57	.07
15	35	0-35	55.8	47.5	.11
16	50	0-50	49.5	41	.19
17	10	15-25	52.9	37	...
18	10	25-35	44.8	31.7	...
19	10	35-45	39	...	.14
20	20	10-30	52.9	39.5	...
21	20	20-40	45	...	...
22	20	30-50	39.3	28.5	.14
23	30	20-50	42	30.5	.12

Natural Gas

East Ohio Gas Co. Expands Underground Storage

The East Ohio Gas Co. was authorized by the Ohio Utilities Commission to purchase 11 gas wells and 309 acres of leaseholds in furtherance of its underground storage project.

The acquisitions cover the following properties: Howard B., Enid W. and Randolph R. Fawcett, one well and leaseholds in Plain Township, Stark County; Claude E. Bettler, seven wells and 287 acres in Jackson Township, Stark County; two wells and 21 acres in Franklin Township, Summit County, and one well and 1 acre in Green Township, Summit County.

Carbon-Black Facilities to Grow in 1945, Says WPB

WASHINGTON.—Further expansion of facilities for the manufacture of carbon black, large quantities of which are exported, is in prospect for 1945, according to War Production Board. New plants costing $19,500,000 were approved in 1944. They will be located in the oil regions of the Southwest. Manpower shortages will pose an acute problem in carbon-black production, WPB officials said.

Manufacturers to Acquire Facilities of Affiliates

WASHINGTON. — Federal Power Commission has authorized The Manufacturers Light & Heat Co., a new corporation, with principal offices in Pittsburgh, to acquire and operate all facilities of The Manufacturers Light & Heat Co., a predecessor; Greensboro Gas Co., Manufacturers Gas Co., Pennsylvania Fuel Supply Co., and Fayette County Gas Co. The first four companies, all Columbia Gas & Electric Corp. subsidiaries, have been merged to form the new corporation, which has entered into an agreement for the acquisition of Fayette's properties, also a part of the Columbia system.

In a second order the commission approved the new Manufacturers Light & Heat Co.'s proposals to eliminate from its gas plant accounts a net total of $21,335,726 in excess over original cost of two of the predecessor companies' properties. The elimination will be effected by charges to reserve for retirements and capital surplus, the order says. This total represents a net excess over original cost of $7,014,489 pertaining to Greensboro's plant accounts and $14,321,237 to the constituent Manufacturers Light. Reclassification and original cost studies of the property and plant accounts of Manufacturers Gas, Pennsylvania Fuel and Fayette have not yet been completed, but the new company estimates that downward adjustments of $2,028,777 will be required.

"The acquisition," the commission's order says, "will result in corporate simplification, savings in bookkeeping and accounting expense, slightly reduced operating expenses, and simplification of accounting and corporate records, and will improve the service rendered by permitting the elimination of manually-controlled valves now located at interconnections between the facilities of the respective companies."

Texas Legislature to Take Up Conservation of Gas

AUSTIN.—The Texas Legislature, which opened sessions this week, will grapple with the thorny problem of natural-gas conservation. Complicating the question is the issue of exporting gas from the state. An effort will be made to have conservation and exportation dealt with as associated problems.

No scientific estimate of the state's natural-gas reserves has been offered, but they are immense by any standard. New ones are being opened virtually every week. With the exception of the West Texas Permian basin and in some portions of the great Panhandle reserve the gas is without sulfur content.

Those who favor movement of gas to points outside Texas contend that if exportation of gas is prohibited, the state also should prohibit exportation of its oil and thus force oil companies to process all oil in the state, and to sell the bulk of the gasoline within the state.

The Railroad Commission has set a maximum gas-oil ratio of 2,000. Thus if a well is making 100 bbl. of oil daily, it may produce 200,000 cu. ft. of gas. This would mean daily wasted gas production of 20,000,000 cu. ft. for a pool of only 100 wells.

Natural-gas men say it would be true conservation to allow this gas to be gathered and exported rather than to allow it to be blown into the air as is done at the present time—legally.

New Highs Set by Natural Gas and Natural Gasoline

WASHINGTON.—New highs were recorded in the natural-gas and natural-gasoline industries in 1944, a statement issued by Department of the Interior reveals. The marketed production of natural gas increased about 9 per cent to an estimated total of 3,735,000,000,000 cu. ft. compared with 3,415,000,000,000 in 1943. Less expansion in demand for industrial applications was indicated than in 1943. The total value of natural gas at points of consumption in 1944 was estimated at $820,000,000.

The natural gasoline industry increased its output of light products 13 per cent in 1944 to approximately 4,200,000.000 gal., of which 3,040,000,000 was natural gasoline and cycle products and 1,160,000,000 liquefied petroleum gases. The value of all products at the plants was about $185,000,000.

OPA and OES Ask That Increase Be Suspended

WASHINGTON.—Office of Price Administration and Office of Economic Stabilization have filed with Pennsylvania Public Utility Commission a request that a proposed increase in gas-service rates in the Pittsburgh area be suspended. The increase, which will automatically be put into effect by Equitable Gas Co. on February 10 unless the commission suspends it, would raise the cost of gas service by approximately $1,400,000 a year. This is about 10 per cent of the company's annual revenue, OPA said.

The petition to the commission was filed under the Stabilization Act of 1942, which provides that no utility may increase its rates without giving 30 days' notice to OPA and OES and consenting to intervention by these agencies before the regulatory commission so that they may oppose increases which are considered contrary to the nation's stabilization program.

The petition points out that many of the company's customers are engaged in war production and that an increase in their cost of living would contribute to pressure upon the wartime economy.

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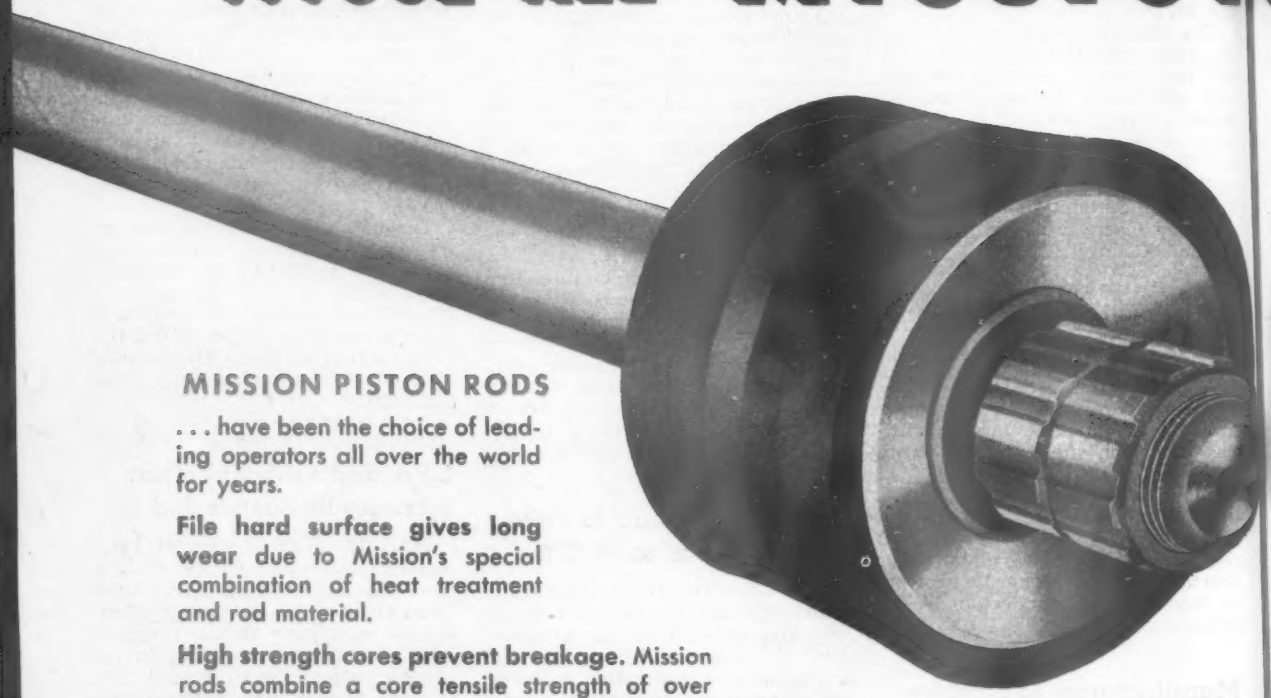

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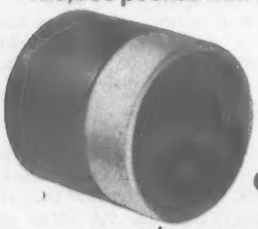

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REFINING

Reexamination of Refinery Wages Asked by WLB

DALLAS.—Reexamination of oil-refining wage brackets set by Eighth Regional War Labor Board for Oklahoma, Texas Panhandle and northern Louisiana was asked last week by Carroll R. Daugherty, wage stabilization director of the national WLB. Daugherty's request grows out of the controversial discussion of these wage brackets between the national and regional boards.

The national board has requested that the wage brackets be examined by the cluster method, a different technical approach to setting scales for the job classifications.

Daugherty, head of Hunter College (New York) economics department, who has been with WLB since October 1942, is making his first visit to the Dallas regional office.

"The wage-stabilization program is facing its biggest task now because of the increased upward pressure on wages stimulated by the current war-production boom in a short labor market," Daugherty said.

No change in the national policy to keep wages stable is planned, Daugherty said. Efforts of the wage-stabilization division have slowed the increase in wages from about 1 cent a month before the program became effective to ¼ cent a month.

Jefferson Chemical Co. Names Top Engineers

NEW YORK.—Appointment of Dr. M. Neuhaus as director of research, L. P. Scoville as chief engineer, and J. M. Porter as chemical engineer, were announced today by P. M. Dinkins, vice president and general manager of the newly formed Jefferson Chemical Co., jointly owned by The Texas Co. and American Cyanamid Co.

Dr. Neuhaus has been associated with The Texas Co. for the last 12 years in its producing and refining departments. Most of his activities have been connected with research in the Beacon, N. Y., laboratory, the Port Arthur, Tex., research laboratory and refinery, and in the company's New York office. Scoville has been associated with The Texas Co. for over 12 years in the engineering division of the refining department where he had charge of the design of petroleum refinery equipment. Porter has been with the American Cyanamid Co. since 1928. For the past 4 years he has been employed in the technical department and previous to that in various chemical engineering, research and production positions. These men will form the nucleus of the initial research, development and engineering program which is being planned by Jefferson Chemical Co., Inc.

El Segundo Plant to Have Cafeteria and Kitchen

LOS ANGELES. — Standard Oil Co. of California has awarded a contract for construction of a modern cafeteria and kitchen at its El Segundo refinery. The building, a steel and concrete one-story structure 75 by 154 ft. with a 43-ft. by 44-ft. ell, will have a total floor space of approximately 13,500 sq. ft. The dining room will be 90 by 75 ft. with a raised platform at one end. It will accommodate 348 persons at 87 tables. Acoustical material will cover the cafeteria ceiling to reduce service noises. The kitchen, 54 by 26 ft., will contain modern equipment.

Schroeder Named Head of Synthetic-Fuel Research

WASHINGTON.—Dr. W. C. Schroeder has been named acting chief of the new office of synthetic-liquid fuels created by U. S. Bureau of Mines to make an exhaustive study of production of gasoline from coal. An initial appropriation of $5,000,000 for the project has been made by Congress. The cost of making motor fuel from coal is placed at 12 to 25 cents a gallon, compared with 5 cents from petroleum. America is estimated to have 3,000,000,000 tons of coal reserves, but some authorities say her oil reserves will be exhausted in 15 years.

Three demonstration plants are to be built, one for extraction of oil from shale, another for extraction of liquid fuels from coal, lignite, farm and other products, and a third for the same purpose, but using a different process.

Shale, mined like coal, is crushed

and charged into an oven. From 20 to 50 gal. of crude shale oil are liberated from a ton of material.

Under the Bergius process, patented in Germany in 1914, coal is converted to oil by removing the oxygen and increasing the hydrogen.

In the Fischer-Tropsch process, also German born, coal or coke is burned with a shortage of oxygen. In the presence of steam this gives up carbon monoxide and hydrogen gases. These are purified and at controlled temperatures are passed over a catalyst of cobalt and thorium oxide. They react to give carbon hydrogen gasoline by the methods normally used in the petroleum industry.

Many Refinery Products in Prospect From Tar Sands

EDMONTON, Alta.—A wide range of products will be refined from oil produced in the Athabaska tar-sand area at Bitumont, north of Waterways, if experimental operations planned yield favorable results. In a statement with reference to its sponsorship of these operations, the Alberta provincial government gives details of the project, which is designed to determine the economic feasibility of separating oil products from the sands.

Oil Sands, Ltd., has agreed to erect the pilot plant. Operations will be under supervision of a three-man board, comprising Hon. N. E. Tanner and Hon. W. A. Fallow, representing the government, and L. R. Champion, president of Oil Sands, Ltd.

The Alberta Legislature at its last session voted $250,000 to finance the project. According to the statement, experimental work already conducted shows that the process to be utilized completely removes all sand. There are no major mining, separating or processing problems, and commercial products ranging from high-test aviation gasoline to asphalt are possibilities. In tests already made the plant, it is stated, has produced sand-free crude at the rate of 150 bbl. in 9 hours. The operations now undertaken are designed to determine whether the processes are sufficiently economical to permit these products to compete in the open market. Extensive use of the asphalt hyproduct in road construction in Alberta is forecast.

Fuel-Oil Ration Unchanged In Pacific Northwest

WASHINGTON.—The fuel-oil ration of 10 gal. per unit in the Pacific Northwest remains unchanged for Period 3, which began January 8, Office of Price Administration announced last week. Continuation of the 10-gal. unit value in the rationed Pacific Northwest, which includes Washington, Oregon and the western counties of Idaho, was recommended by Petroleum Administration for War. Supply conditions in that area remain critical, both because of the transportation problem and the heavy military withdrawals for the Pacific war. In holding the 10-gal. value, OPA cautioned consumers to make it go as far as possible, since extra rations probably will continue to be unobtainable.

The Period 3 coupon value for the East Coast will not be announced until a recommendation, based on latest current supply figures, is made by PAW at consultations to be held between that agency and OPA shortly before Period 3 begins on the East Coast January 15. Period 3 coupons already are valid at 10 gal. per unit in the midwestern and southern states for fuel-oil rationing. Periods 2 and 3, and Periods 4 and 5 are combined in those areas.

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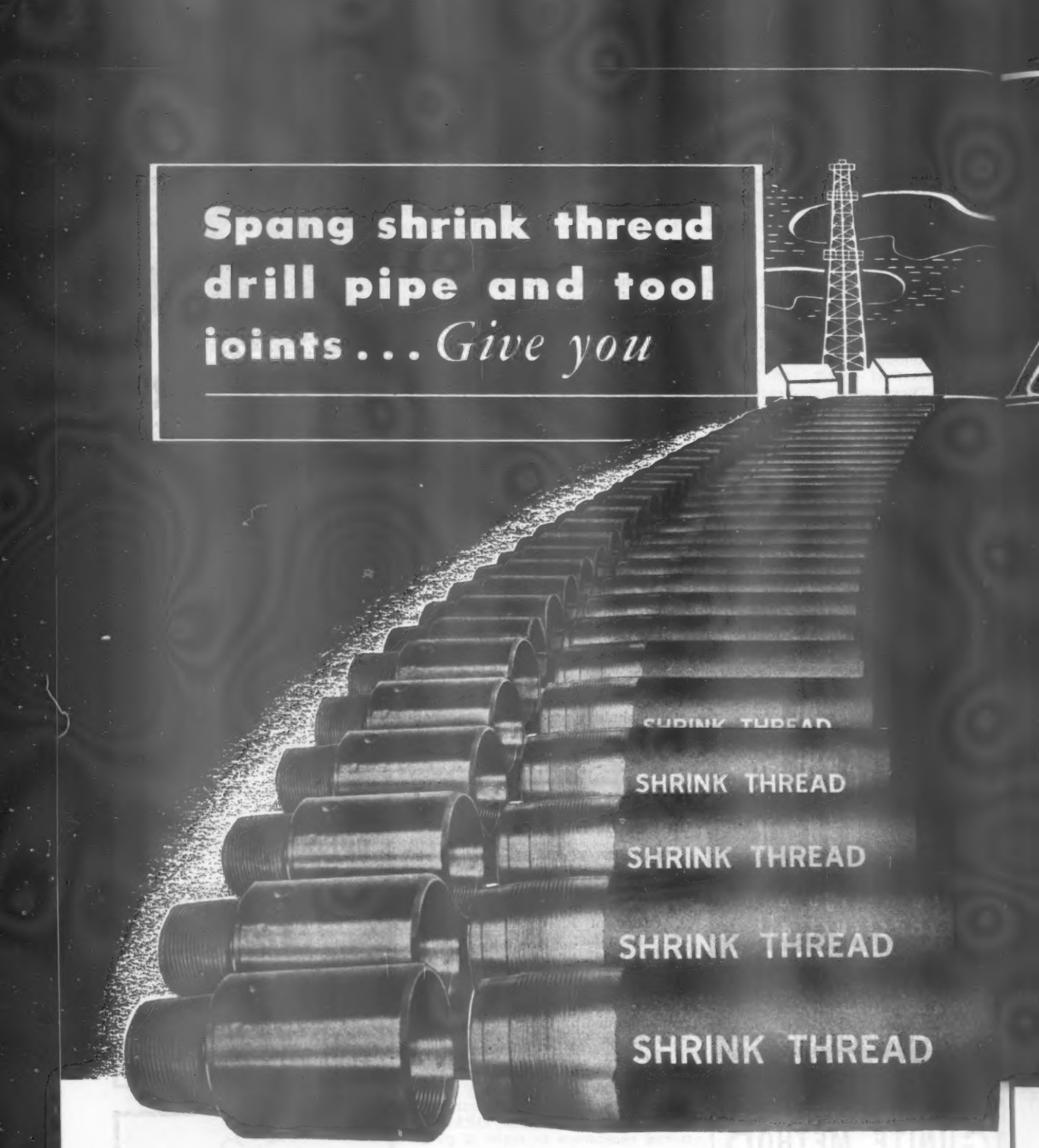

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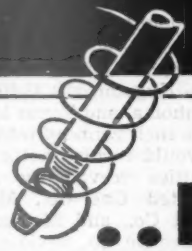

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PIPE LINES

Reynosa Plans to Pipe Gas From Texas to Mexico

WASHINGTON. — Federal Power Commission has set February 8 as the date for a hearing on the application of Reynosa Pipe Line Co., of Corpus Christi, for authorization to export gas from Texas to Mexico, for distribution in the city of Monterrey. Reynosa proposes to build approximately 30 miles of 12¾-in. pipe line, extending southerly from La Blanca field, Hidalgo County, Texas, through the North and South Weslaco fields in that county, and from there westerly to the American shore of Rio Grande River. At this point the line will connect with about 3,000 ft. of 8⅝-in. parallel pipe lines, which are to be extended across and underneath the Rio Grande to the international border near Reynosa, Mexico. These facilities will connect with a 14-in. transmission line of Gas Industrial de Monterrey, S. A., to which Reynosa has agreed to sell and deliver up to 60,000,000 cu. ft. of gas daily for distribution in the vicinity of Monterrey.

Atlantic Buys United's East Texas Oil System

Atlantic Pipe Line Co., subsidiary of the Atlantic Refining Co., is reported to have purchased for $225,000 the pipe-line system of the United Pipe Line Co. extending from the tristate Rodessa pool of Texas, Louisiana and Arkansas, to the East Texas field.

The transaction included 60.88 miles of 8-in. trunk line, extending from the Caddo Parish, Louisiana, portion of Rodessa across Cass, Marion, Harrison and Gregg counties in a southwesterly direction to a terminal in the William Robinson Survey in Gregg County, Texas.

Four pumping stations, all machinery and equipment, storage tanks and approximately 10 miles of 4-in. lateral lines were included in the sale, as well as the telegraph system from the Rodessa terminal of the system to Gregg County.

The pumping stations involved were the Sexton, Caddo Parish, Louisiana; Johns, Burford in Cass County, Texas, and the Hutchinson station in Marion County, Texas.

Storage facilities include one 80,000-bbl., one 55,000-bbl. and two 1,000-bbl. capacity tanks.

SEC to Hold Hearing on $70,000,000 Gas Line

PHILADELPHIA.—The projected organization by American Light & Traction Co. of a new company to build, own and operate a $70,000,000 natural-gas pipe line received a hearing before Securities and Exchange Commission January 12.

The proposed line would extend from the Hugoton gas field in Kansas, Oklahoma, and Texas to Detroit, with a branch running into Wisconsin. It would furnish natural gas to communities served by Michigan Consolidated Gas Co., Milwaukee Gas Light Co., and Madison (Wis.) Gas & Electric Co., besides communities in Illinois, Iowa and Missouri.

Johnson Prepares for Cushing-Yale Line

Johnson Oil Refining Co. is digging up pipe from old lines in preparation for laying 9 miles of 4-in. for transporting sour crude oil from the Standard Oil Co. (Indiana) tank farm at Cushing to the Johnson system at Yale, Okla. The Johnson refinery at Cleveland, Okla., has been revamped to provide for handling sour crude.

Socony-Vacuum Builds Line in Bolivar Area

Socony-Vacuum Oil Co., Inc., is laying a 6-in. crude-oil pipe line from Indian Crossing near Eldred, N. Y., into Alma and Bolivar townships to take over the Messer Oil Co.'s production. The line will pass through Myrtle and up the Honeoye Valley to South Bolivar, N. Y., then up California Hollow, with one branch to Vosburg, the other to Pikeville. At Indian Crossing connection is made with the company line to the Socony-Vacuum Oil Co.'s refinery at Olean, N. Y. The cost of the new line will be around $190,000.

The Olean refinery has been seek-

ing crude oil for some time and the contract with Messer will cover about 1,000 bbl. a day. The contract is for 10 years and calls for the price paid for Bradford grade crude. Whether Socony-Vacuum will solicit or accept crude from other leases than those of Messer Oil Co. has not been announced. Vacuum Oil Co. of Olean formerly owned a pipe line from Olean to Bolivar which was in operation for several years but later the line was taken up and the pipe used elsewhere.

Sohio-Phillips Complete West Edmond Outlet

The 18-mile 8-in. crude-oil pipe line built jointly by Sohio Petroleum Co. and Phillips Petroleum Co. interests to provide an outlet from the West Edmond, Oklahoma, field has been completed and put in operation for delivering to Oklahoma Pipe Line Co. and other systems in the Oklahoma City area.

Winter Conditions Retard Pipe-Line Construction

Muddy ground in West Texas and frozen ground in northern areas have retarded pipe-line projects now under construction.

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Pipe dug up from Gulf Refining Co. systems in Texas and Oklahoma is being delivered to West Texas for Gulf's 63-mile 8-in. crude-oil line being laid by Sharman & Allen from the Keystone-Ellenburger pool, Winkler County, to Midland. The new line is to be placed in service in March.

To provide additional capacity to be available next month, Texas-New Mexico Pipe Line Co. is building 30 miles of 12-in. loops contracted by Midwestern Engineers being laid along the crude-oil main line at locations between Crane and Houston.

Sinclair Refining Co. is laying 25 miles of 8-in. crude-oil line contracted by O. C. Whitaker Co., from the new producing area in 14-32-95w, Fremont County, Wyoming, to the company's system at the Lost Soldier pump station.

Colonial Beacon Oil Co. has dug approximately half of the ditch for the 35-mile products line of 4-in. and 6-in. pipe from Everett to Methuen, Mass. Slow progress has been reported in welding operations.

Three outlets from the Elk Hills field, California, totaling 77 miles built by General Petroleum Corp. of California, Union Oil Co. and The Texas Co. have been completed and are in operation.

WEP Lines Maintain High Throughput

Pumping of crude oil through the War Emergency Pipelines, Inc., 24-in. crude-oil line from Longview, Tex., averaged 316,951 bbl. daily from December 9 to 15. Pumpings through the WEP 20-in. products pipe line from Beaumont, Tex., in the same period averaged 211,658 bbl. daily. During the week ended December 13, Southwest Emergency Line pumped an average of 76,248 bbl. daily from the Heard station in the Corpus Christi, Tex., area to Houston connections.

WEP Employes Vote On Union Affiliations

The National Labor Relations Board announced certification of Oil Workers International Union (C.I.O.) as collective bargaining representative for operating and maintenance employes of the second division of War Emergency Pipelines, Inc., Baytown, Tex.; Saine, La., and Balk Knob, Ark.

The certification was a result of an election held among this group of employes on December 21. The board said results of an election among employes in the concern's first division were inconclusive and therefore no disposition of that division's case was made at this time.

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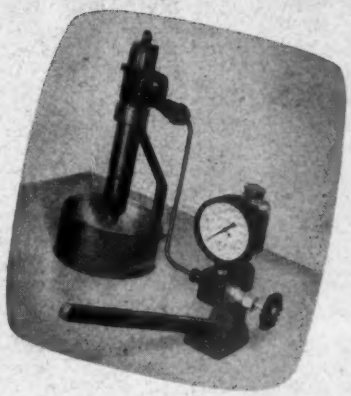

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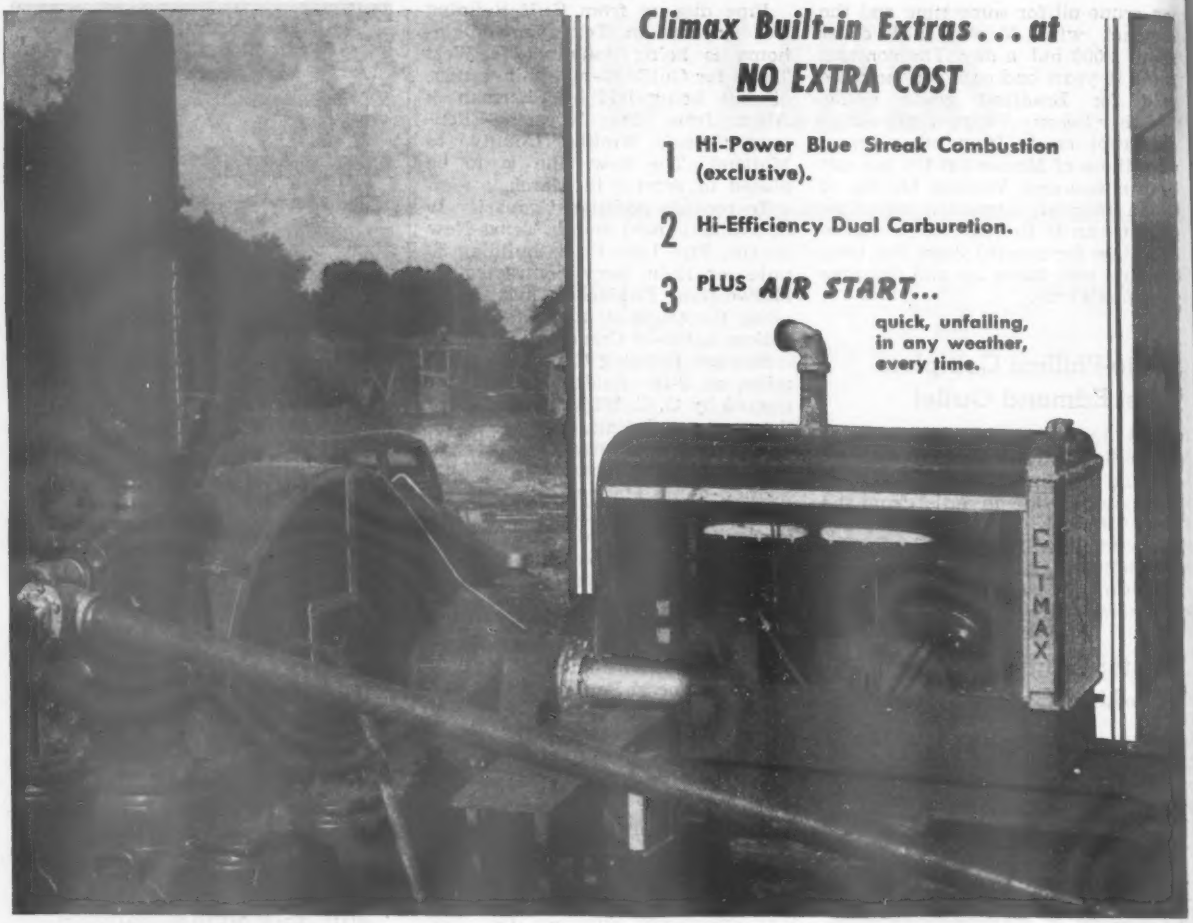

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Exploration and Drilling

Week's Highlights

AS the year opened, Oklahoma operators and land men were in a flurry of excitement about a series of wildcats at the testing stage. Most of these were grouped in Oklahoma County and the counties surrounding it, with three sands considered potential producers; first the Wilcox sand, always a prize objective; second the Hunton lime, once looked upon with contempt, prior to the development the West Edmond field; third, the Bartlesville sand, or its equivalent.

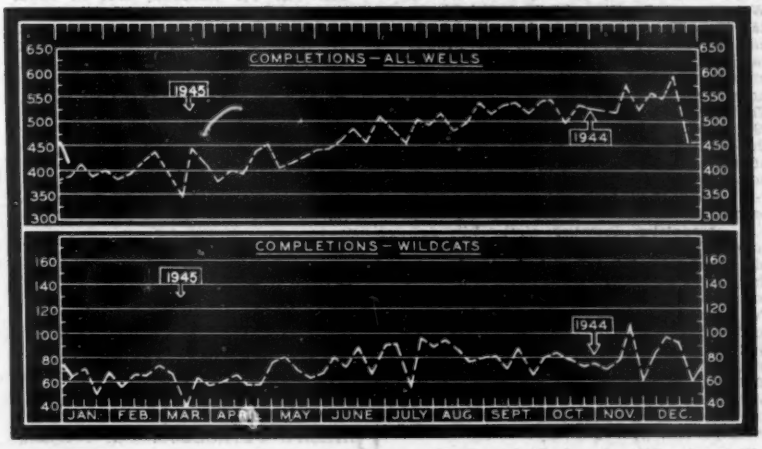
It is largely on the developments in this area that Oklahoma operators stake hopes of regaining third place among the oil-producing states during 1945. This development is a perfect example of the old adage that the best place to find new oil fields is in the same general area that other fields have been found.

The spark that touched off the intense interest in the Oklahoma County area was the development of West Edmond into a major field, plus the discoveries at West Moore, South Moore, Washington and West Noble. Geologically, these pools are all generally related to the Anadarko basin, and so are most of the wildcats.

Nevertheless, it is obvious from an oil-field map of Oklahoma that this area has been a logical place to look for new fields ever since the discovery and development of the Oklahoma City field. Obviously something held back wildcatting activities in this area for many years. The retarding force equally obviously was more a matter of economic conditions than geological problems.

Of course the geology has been complicated by the depth to potential producing formations, the tapering off of the Nemaha ridge, and the development of the edge of the Anadarko basin. These unknowns complicated the interpretation of geophysical data.

However, the wartime demand for Oklahoma oil, plus the developments at West Edmond changed the economic picture and the attractiveness of such wildcat plays, with the result that problems of geological interpretation have not been considered too hazardous to further delay wildcatting.



Solid line charts current weekly completions, service wells in Eastern area included

COMPLETIONS IN ALL FIELDS . . .

Week ended January 6, 1945

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1945	1944
N. Y., Penna., W. Va.	41	12	*37	90	132,028	90	58
Ohio	3	7	6	16	29,995	16	18
Indiana	1	0	2	3	4,215	3	3
Kentucky	5	1	5	11	19,468	11	11
Illinois	22	0	15	37	95,000	37	33
Michigan	9	1	13	23	68,915	23	8
Kansas	13	2	10	25	82,307	25	22
Nebraska, Missouri, Iowa	0	1	1	2	1,785	2	4
Oklahoma	12	0	8	20	84,605	20	21
Texas:							
North Central	12	0	18	30	77,493	30	16
West	18	0	1	19	89,871	19	31
Panhandle	0	0	0	0	0	0	1
Eastern	6	1	5	12	80,056	12	10
Gulf Coast	21	1	9	31	204,942	31	7
Southwest	8	0	5	13	60,082	13	18
Total Texas	65	2	38	105	512,444	105	83
Louisiana:							
Northern	3	2	2	7	22,632	7	4
Southern	7	0	2	9	88,132	9	3
Total Louisiana	10	2	4	16	110,764	16	7
Arkansas	3	0	2	5	33,060	5	3
Mississippi	0	0	0	0	0	0	7
Southeastern States	0	0	0	0	0	0	†
Montana	4	0	1	5	13,943	5	3
Wyoming	3	0	1	4	19,787	4	0
Colorado-Utah	1	0	0	1	6,870	1	1
New Mexico	5	0	0	5	11,459	5	4
California	32	2	14	48	183,710	48	40
Total United States	229	30	157	416	1,410,355	416	326
Total previous week	233	37	188	458			
Total Jan. 8, 1944	169	41	116	326			

*Includes 36 service wells. †Included in total shown for Mississippi.

ROCKY MOUNTAIN

Dakota Pay Sought on Golden Eagle Structure

DENVER.—The Pioneer Oil Corp. (R. S. Shannon) may score the first discovery of 1945 in the Rocky Mountain in its test to the Dakota sand on the Golden Eagle structure in Hot Springs County, Wyoming, 2 On Time-OPC, C SW SE 12-45n-97w. The prospect is ⅛ mile southeast of a 1944 discovery in the Muddy sand which tested 250 bbl. of 58°-gravity oil through choke on the tubing in a 12-hour test, with 3,500,000 cu. ft. of gas. The second well had the Muddy at 6,911-59 ft. and showed practically the same as the discovery, but continued for a test of the Dakota and Lakota sands. It is bottomed at 7,379 ft., at which point the 7-in. was set through the Lakota. It is preparing to test the two deeper horizons.

A competitor for the first—1945—discovery honor is Continental Oil Co. 1 Ida Goodstein, NE SE SW 20-57n-99w, on the South Elk Basin structure, which is coring at 5,572 ft. and headed for the Tensleep, the principal producing horison in Elk Basin. It had the top of the Dakota at 5,394 ft., and in a drill-stem test, open 4 minutes, showed for between 10,000,000 and 12,000,000 cu. ft. of gas. While the indications are very favorable for oil in lower horizons, it is already an important gas discovery.

Water in Cloverly at Spring Creek.—Phillips Petroleum Co. 2 Unit, CNL NE NW 7-28n-92w, Spring Creek structure, Fremont County, Wyoming, topped the Cloverly at 3,070 ft. and drilled to 3,103 ft. A drill-stem test at 3,086-3,103 ft., open 15 minutes, showed 2,200 ft. of fresh water, 125 ft. of mud and no oil. The objective is the Tensleep, but at present it is shut down for orders. It is a northeast offset to 1 Hitze Unit which was abandoned at 4,808 ft. when cores showed it was drilling in steep dips.

Tensleep test at Gebo.—Continental Oil Co. 4 Gebo Unit, SW SE NE 23-44n-95w. Gebo dome, Hot Springs County, Wyoming, ¼ mile east of the discovery in the Tensleep and ½ mile northeast of the discovery in the Embar, swabbed 387 bbl. of pipe-line oil from the upper Tensleep after plugging off water in the base of the sand at 5,185 ft. After testing it will plug back and complete in the Embar to conform to the field's spacing pattern.

WYOMING WILDCAT COMPLETIONS

Fremont County, Big Sand Draw: Sinclair-Wyoming 1 Unit, SW NW NW 14-32n-95w, TD 7,588 ft., still in sand. Top Embar (before electric survey) 6,896 ft., drill-stem test at 6,896-6,913 ft., open 57 minutes, 1,560 ft. oil, 633 ft. oil-cut mud, 90,000 cu. ft. of gas, oil 32.5° gravity, gas potential in lower part of sand est. 15,000,000 cu. ft., top Tensleep 7,285 ft., 7-in. 7,281 ft., reported to have flowed more than 1,000 bbl. per day 35.5°-gravity oil on production test.

Lysite: Ohio 1 State, NW NE NW 16-39n-91w, TD 2,500 ft., top of Tertiary 328 ft., dry.

KANSAS

Two Successful Tests For Barton County

PHILLIPS PETROLEUM CO. 1 Spani, NE NW NE 36-20-14w, southwest of the Hiss pool in Barton County, has either opened a new pool or extended the Hiss pool about 1 mile. At 3,250-63 ft., in the Lansing lime, 2,750 ft. of fluid rose in the hole, mostly oil. In a preliminary test, the well gaged 10,000,000 cu. ft. of gas and later flowed 31 bbl. of oil in 6 hours. Operators are attempting to shut off the gas in order to test the oil.

Another strike for Barton County was the W. Hartman 1 Penning, SW NW SW 35-19-12w, just south of the Hammer pool. Five-inch pipe was set in the top of the Arbuckle at 3,351 ft., and 2,000 ft. of oil rose in the hole in 7 hours. Tops were Lansing at 3,013 ft., and Arbuckle at 3,350 ft.

Barber County.—Lion Oil Co. 2 Allen, NW SE NE 2-30-14w, the offset to the discovery well of the new Clara pool, the No. 1 Allen, is running a Schlumberger survey. The Simpson shale was cut at 4,436 ft., and the Arbuckle at 4,471 ft. Drill-stem tests at 4,498-4,503 ft., and 4,542-52 ft. recovered oil, gas, mud and water. Total depth at present is 4,578 ft.

Sedgwick County.—Anderson-Prichard Oil Co. 1 Bartholomew, NW NW NW 8-27-4w, near the abandoned Cheney pool, has set 5½-in. pipe at 4,034 ft., just above the Viola, topped at 4,035 ft. Coring from 4,037 to 4,042 ft., 5 ft. of Viola was recovered, with the top foot showing good saturation.

KANSAS WILDCAT COMPLETIONS

Barton County: Willis Hartman 1 Carrol, SE SE NE 2-20-13w, dry, TD 3,497 ft., Arbuckle 3,482 ft.

Brown County: Clifton Gall 1 Livengood, NE NW NW 3-1-15e, pumped 85 bbl. of 26.5°-gravity oil from pay zone 2,578-2,590 ft., TD 2,590 ft., Krider 2,345 ft., Hunton 2,578 ft.

Cowley County: Grallup & McNish 1 Roberts, SW SE NW 12-31-3e, dry, TD 3,334 ft., Arbuckle 3,328 ft.

Doniphan County: R. L. Ferguson 1 Boeh, SE SE SW 32-2-22e, dry, TD 2,007 ft., Herington 1,877 ft.

Kearny County: Carter 1 Strong, NW SE 27-22-35w, 3,000,500 cu. ft. gas from pay zone 2,535-2,621 ft., TD 3,033 ft., Herington 2,535 ft., Krider 2,585 ft.

Marion County: Ward McGinnis 1 Stenzel, NE NW NW 10-19-4e, dry, TD 2,347 ft., Mississippi lime 2,292 ft.

McPherson County: Delk Oil 1 Voth, SE SE SW 12-19-1w, dry, TD 2,917 ft., Mississippi lime 2,872 ft.

Reno County: Skelly and Magnolia 1 Theis, SE SE NW 31-26-4w, dry, TD 4,150 ft., Arbuckle 4,134 ft.

Plains Exploration 1 Pains, NE NE SW 26-23-10w, dry, TD 4,047 ft., Arbuckle 3,997 ft.

Rice County: Phil Han 1 Brown, SE SE SW 9-21-6w, dry, TD 3,516 ft., Mississippi lime 3,496 ft.

MISSOURI WILDCAT COMPLETION

Atchinson County: Claude McQueen et al 1 Meyers, SE SE NE 25-64n-39w, dry, TD 1,480 ft., basal Hertha 880 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 6 crude oil	Distillate, allied products	January PAW quota all oils	Dec. 30 crude oil
Arkansas	81,000	4,900	84,900	80,750
California	886,250	59,800	947,800	885,250
Colorado	9,450	.....	9,500	8,650
Eastern	63,000	8,550	76,750	62,450
Illinois	206,400	12,000	212,000	202,800
Indiana	12,600	.....	12,500	12,400
Kansas	229,900	6,000	280,000	271,100
Kentucky	29,600	2,800	34,800	32,500
Louisiana	359,650	36,000	391,000	360,650
North Louisiana	70,450	.....	.....	71,000
South Louisiana	289,200	.....	.....	289,650
Michigan	49,250	600	47,600	54,000
Mississippi	49,700	.....	53,300	52,300
Montana	22,300	350	23,350	23,600
Nebraska	1,000	.....	1,200	1,000
New Mexico	103,100	5,600	110,600	103,000
Oklahoma	361,200	26,000	378,000	360,000
Texas	2,120,350	150,000	2,274,000	2,111,600
East Texas	370,900	.....	.....	371,900
East Central Texas	144,050	.....	.....	141,500
North Central Texas	143,150	.....	.....	140,550
Texas Panhandle	88,700	.....	.....	88,800
West Texas	478,600	.....	.....	471,300
South Central (S. A.)	20,050	.....	.....	20,050
South Texas (Laredo)	78,400	.....	.....	79,000
Lower Gulf Coast	243,900	.....	.....	246,300
Upper Gulf Coast	552,600	.....	.....	553,100
Wyoming	92,600	3,500	103,500	92,300
Total United States	4,677,350	316,100	5,040,800	4,714,350
Change from previous week	down 37,000	.....	.....	.....
Total production January 1-January 6, 1945				28,064,100 bbl.
Same period last year				26,189,240 bbl.

ILLINOIS

Wildcat Discoveries in 3 Pays in 3 Counties

CENTRALIA.—Wildcat wells drilled into prolific production from Aux Vases sand in Hamilton, McClosky lime in Richland and Cypress sand in White counties. Ohio Oil Co. abandoned its deep test in Douglas County, 1 Shaw, SW SW SW 36-16n-8e, at 4,151 ft. An incomplete log shows Devonian lime was topped at 45 ft., Trenton lime at 948 ft., Mount Simon sand at 4,045 ft. It was dry all the way.

The Noble, Clay City, Bennington and Sims North pools showed the largest new pool producers of the week, but none of them exceeded 300 bbl. initially.

Forty-three new operations were started including the following wildcats: Pure 1 H. Miller, SE SE NW 27-2n-7e, Wayne County; National Producers 1 Maudlin estate, SW SE SE 35-3n-5e, Clay County; Texas Co. 2 Inland Steel, SE SW NW 25-4s-1e, Jefferson County; Superior Oil 4 Garrison, SE SE SE 19-1s-2e, Jefferson County; C. A. Baldwin 1 Leith, SW SW NE 28-3n-1e, Marion County; National Associated Oil Co. 1 A. Kuhn, SW SE NW 28-1n-1w, Clinton County; K. M. Boyer

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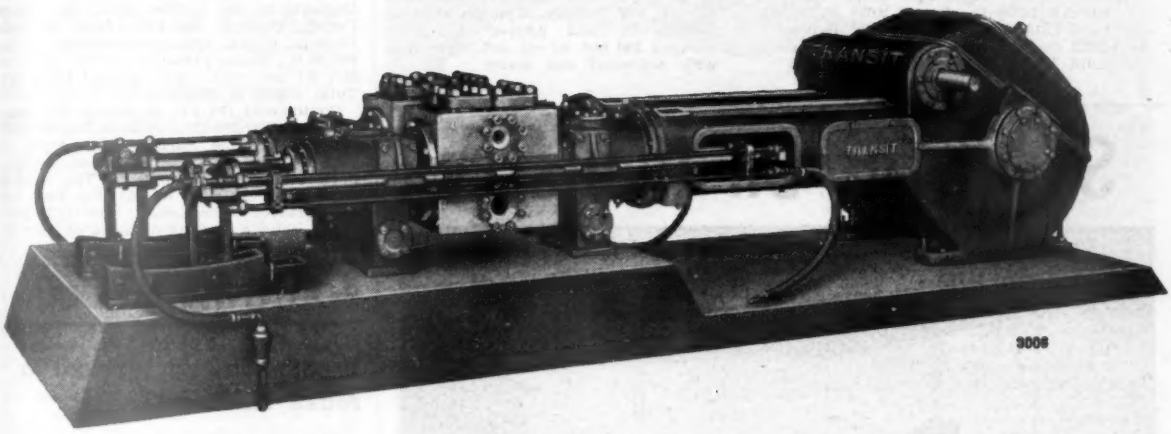

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1 Telford, NE NW NE 4-1s-1e, Jefferson County.

ILLINOIS WILDCAT COMPLETIONS

Bond County: B. F. Thompson 1 Elmore, SE SE NE 11-6n-2w, dry at 1,301 ft., Golconda 901 ft., Cypress 1,072 ft., Benoist 1,162 ft., Aux Vases 1,210 ft., McClosky 1,287 ft.

Coles County: H. B. Dougherty et al 1-A Reinhardt, SE NE SE 29-12n-8e, dry at 313 ft.

Effingham County: W. W. Shafer et al 1 Gibson, NW NW SE 36-6n-5e, dry at 2,557 ft. Glen Dean 2,029 ft., Cypress 2,209 ft., Benoist 2,335 ft., Aux Vases 2,411 ft., McClosky 2,501 ft.

Fayette County: Magnolia 1 Wasmith, NW SE NE 24-5n-1e, dry at 2,028 ft. Menard 1,310 ft., Cypress 1,703 ft., Benoist 1,852 ft., Aux Vases 1,891 ft., Fredonia 2,010 ft.

Paul Doran 1 J. Goldfield, NE NE NW 12-6n-1w, dry at 1,691 ft. Tar Springs 1,152 ft., Glen Dean 1,170 ft., Cypress 1,356 ft., Ste. Genevieve 1,576 ft.

Hamilton County: Sinclair-Wyoming 1 Clyde Russell, SW SE SW 17-7s-5e, Aux Vases sand 3,131-39 ft., shot with 40 qt., swabbed 425 bbl. in 24 hours.

Richland County: Pure and Ohio 1 Koertge Consolidated, NE NE NW 33-3n-10e, McClosky lime at 3,166-99 ft. at intervals, acidized, pumped 149 bbl. of oil and 97 bbl. of water in 24 hours.

Wabash County: H. W. Keahey 1 Ed Abbell, NE NE NE 36-2n-13w, dry at 2,037 ft. Shot with 75 qt. at 1,264-94 ft. Filled up with water.

White County: W. I. Lewis 1 Burkhart, SE NE SW 18-5s-9e, Cypress sand at 2,831-37 ft. and 2,844-47 ft. Shot, pumped 200 bbl. of oil, cut 5 per cent with sediment and water.

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SOUTH LOUISIANA

Venice and LaPice Fields Report Completions

NEW ORLEANS.—Tide Water Associated Oil Co. 27 Buras Levee Board, 34-21s-30e, Venice field in Plaquemines Parish, is completed in perforations at 10,036-48 ft., flowing 215 bbl. daily on ½-in. choke, with gas-oil ratio 710, tubing pressure 1,550 lb., gravity 32.9° corrected, no water. Total depth is 10,401 ft., with 7-in casing set at 10,395 ft.

Shell Oil Co., Inc. completed 1 C. J. Bertaut, in the LaPice field, St. James Parish, flowing 389 bbl. daily through 10/64-in. choke, from perforations at 10,044-50 ft., tubing pressure 1,200 lb., gravity 34°, 0.1 per cent water, gas-oil ratio 704. Total depth is 10,500 ft.

Continental Oil Co. is testing for completion 5 Pardee Co., in 20-4s-1w, Reddell field, Evangeline Parish. Total depth is 9,730 ft. with 6-in. casing set on bottom, perforations at 9,690-9,704 ft. The well is flowing at the rate of 155 bbl. daily of 57.8°-gravity condensate on 10/64-in. choke, showing tubing pressure of 3,100 lb.

SOUTHWEST TEXAS

Brooks County Wildcat to Make Another Test

CORPUS CHRISTI.—Humble Oil & Refining Co. 1 Dan Sullivan, wildcat, 8 miles southeast of Falfurrias, in Brooks County, recovered 15 gal. of 53°-gravity condensate in 20½ minutes on drill-stem test at 7,496-503 ft., using 1-in. top and ¼-in. bottom chokes, with 97 lb. working pressure. Operators drilled ahead to 7,536 ft. and are preparing to make another drill-stem test.

Humble's 33 King Ranch-Cabeza, on the east side of Seeligson field, Kleberg County, recovered 2,024 ft. of oil and 30 ft. of mud, with 3,720 lb. bottom-hole pressure flowing, on drill-stem test from 6,987-7,006 ft., using ⅛-in. bottom and 1-in. top chokes. Total depth is 7,016 ft.

L. D. Ormsby 1 Williamson heirs, wildcat, 9 miles northeast of Floresville, in Wilson County, at total depth of 5,084-ft., with 5½-in. casing at 5,028 ft., acidized and swabbed considerable oil, but would not flow. Operators are preparing to pump.

Humble's 1 McDermott, wildcat, 25 miles north of Roma, in the Sernardo Gutierrez Porcion 14, Zapata County, tested 1 bbl. in 3 hours through ¼-in. choke, with tubing pressure 350 lb., casing pressure 200 lb., from perforations at 2,509-18 ft.

South Texas Geological Society has announced the name "Falls City" has been given the field discovered by Southern Minerals Corp. 1 J. F. Bartosch, in the L. Manchaca Survey, Karnes County.

SOUTHWEST TEXAS WILDCAT COMPLETIONS

Bastrop County: Federal Royalties Co., Inc. 1 E. E. Barnett, 14 mi. W of Bastrop, L. C. Cunningham Sur., dry at 1,660 ft.

Bee County: W. Earl Rowe 1 O. H. Wolters, 10 mi. SW of Beeville, F. O. Skidmore Sur., dry at 4,437 ft.

Duval County: J. W. Gorman, Parker & McCune 1 Juan Carrillo, 5 mi. SW of Realitos, Marcello Hinojosa grant, dry at 4,695 ft.

Goliad County: Lewis Lawlor 1 J. G. Swickheimer, 3 mi. SW of Fannin, Guadrilla Irrigation Co. Sur., dry at 4,850 ft.

Gonzales County: Danciger Oil & Refg.

Co. 1 H. Seidel Weber, 3 mi. SE of Smiley, Geo. W. Petty Sur., dry at 4,217 ft.

Karnes County: Lewis Lawlor 1 Gus A. Johnson, 5 mi. SW of Kenedy, Carlos Martinez grant 1, dry at 6,250 ft.

Nueces County: Blanco Oil Co. and Al Buchanan 1 Luling Foundation, 4 mi. N of Bishop, F. Z. Bishop subd. of Palo Alto grant, dry at 7,513 ft.

San Patricio County: Mikton Oil Co. 1 A. H. Masiran, 5 mi. SW of Edroy, San Patricio De Hibernia grant, dry at 6,729 ft.

Webb County: Dulup Oil Co. 5 Bruni, 12 mi. S of Mirando City, in Albercas grant, dry at 1,646 ft.

TEXAS GULF COAST

Mayes Field Discovery Flows 752 Bbl. Daily

HOUSTON.—Humble Oil & Refining Co. 1 M. E. Mayes, discovery well of Mayes field, Chambers County, is completed flowing potential of 752 bbl. daily through ¼-in. choke, with gas-oil ratio 912, tubing pressure 1,560 lb., 0.2 per cent water, from 15 perforations at 8,166-69 ft. Total depth is 9,994 ft. in shale, with 9⅝-in. casing set at 9,060 ft. Plugged-back depth is 8,180 ft., with 5-in. liner and screen set to 8,180 ft. and 2-in. tubing at 8,002 ft. Humble has asked that this well be designated as discovery well of the Mayes field, stating it is separated by a fault from the 1 Mayes gas well, in Oliver Survey, at Jackson Pasture field. This fault, it is said, lies just south of the gas well and completely separates the reservoirs.

The Texas Co. is preparing to put on pump its 1 Mrs. Madge Hopkins, discovery well about 3 miles northeast of Addicks in Harris County. It was last reported flowing by heads about 3 bbl. a day through ¼-in. choke, tubing pressure 25 lb. from the perforations at 7,702-08 ft. Total depth is 8,014 ft. with 5½-in. casing at 7,760 ft.

Humble's 1 Schmidt on the south flank of the Danbury dome, Brazoria County, is reported flowing at the rate of 7 bbl. an hour through ¼-in. choke, 3 per cent mud, 35 per cent wash water and 62 per cent oil. Gas-oil ratio is 684, tubing pressure 400 lb., casing sealed. The well is still cleaning. It was drilled to total depth of 9,284 ft., ran a series of tests in lower-zone sands, then plugged back to 7,625 ft., the present depth, set 2½-in. tubing at 7,497 ft. with packer and started flowing without swabbing.

Cities Service Oil is completing 1-C Frank Stephens Co. in the Ramsey field, Colorado County. On a 10½-hour test, with ¼-in. bottom and ⅜-in. top chokes, the well flowed at the rate of 101 bbl. of condensate and 5.6 bbl. of wash water daily, accompanied by 4,000,000 cu. ft. of gas, through perforations at 8,948-53 ft. Operators are preparing to perforate the entire section between 8,948 and 8,980 ft. for completion.

Atlantic Refining Co. 1 Houston-American, wildcat in BBB&C Survey, Section 3, Tyler County, recovered gas-cut mud, with some condensate, on a drill-stem test at 8,368-8,460 ft. The well is shut down, waiting orders, with total depth 9,015 ft.

G. W. Strake 1-W P. G. Krohn "B", deep Wilcox test at Conroe, in Montgomery County, is reported abandoned at 12,020 ft., after taking sidewall samples. A slight gas show was encountered at the 9,600-ft. level.

UPPER GULF COAST WILDCAT COMPLETIONS

Chambers County: Texas 1 J. T. White et al, 4 mi. N of High Island, in T&NO

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Sur., Sec. 137, dry at 9,520 ft.
Jackson County: Navidad Co. 1 F. Westhoff, 5 mi. SE of Edna, in Thos. Menefee Sur., dry at 7,505 ft.

CANADIAN FIELDS

Jumping Pound Discovery Better Than Promised

CHATHAM.—Following a 5,000-gal. acid treatment, Shell Oil 4-24-J, LSD 4, 24-25-5w5, discovery well in the Jumping Pound area west of Calgary, is turning out to be a better producer than at first was indicated. Bottomed in Madison limestone at 9,947 ft., it flowed at the rate of 11,700,000 cu. ft. of wet gas daily, with condensate recovery of 57 bbl. in 15 hours, or at the rate of 95 bbl. daily. Gravity of the product fluctuated between 49° and 51°.

The strike is similar in some respects to the early gas-cap area encountered in the Madison in Turner Valley, though the lime appears tighter and the product about 12° lower than the early Turner Valley naphtha and 10° higher than the present crude. Shell Exploration Alberta, Ltd., which handles the development operations, has increased its holdings in the Alberta foothills, its recent acquisitions including extensive acreage in the area between Rocky Mountain House and Bearberry and in the Nordegg-Brazeau area.

Conrad - Taber. — Definite figures are now available on recent completions by California Standard in the Conrad-Taber area, southern Alberta. Conrad-Province 2, LSD 1, 5-6-15w4, the discovery well, plugged back to 2,963 ft. from 3,090, is making 115 bbl. of 25°-gravity crude. Taber-Province 87-15-A, LSD 13, 15-9-17w4, after testing at 3,253 ft., cemented off lower water, gun-perforated the Taber sand, and is making 75 bbl. of clean 18°-gravity oil. Taber-Province 67-15-A, LSD 14, 15-9-17w4, at 3,201 ft. is making around 100 bbl. of 20°-gravity crude. Conrad-Province 55-33-B, LSD 11, 33-5-15w4, is testing Ellis sand at 3,080 ft. A new exploratory well, Conrad-Province 75-36-C, has been spotted in LSD 12, 36-4-15w4, about 7 miles south of the Conrad producers.

North Turner Valley.—British Dominion 7, LSD 12, 17-21-3w5, outpost test in North Turner Valley, with Madison at 8,150-8,639 ft., has 580 bbl. production of 40.8° crude, instead of 347 bbl. as originally reported. This producer extends the field about ¼ mile north and west.

Highwood.—On the Highwood structure west of South Turner Valley, Transcontinent 1, LSD 4, 36-18-3w5, bottoming at 3,333 ft., 299 ft. in the Madison, produced about 1 bbl. of mixed water and 37°-gravity oil on initial tests. It has plugged back to shut off water and will test a lime zone at 3,061-3,260 ft.

West-Central Turner Valley. — Okalta Oils 7, LSD 3, 16-18-2w5, carried down as a potential deep test of the Devonian limestone after getting the Madison at 6,975 ft., faulted from Blairmore to Benton at 8,000 ft. and is being abandoned at 8,548 ft. Test was still in the Benton, and estimated depth of the east side lime block was considered too great for successful drilling by the companies jointly interested.

Abasand operations.—Initial test run of the new Abasand Oils refinery at McMurray in the Athabaska area was completed December 24. Results are still unreported, but G. B. Webster, vice president and managing director, predicted an initial "stream" output of 450 bbl. a day, with 600 bbl. when the refinery is in full operation.

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CALIFORNIA

Deep Well Sets Pattern For Future Drilling

LOS ANGELES.—Standard Oil Co. of California, although it will make no additional hole in 20-13 Kern County Land Co. in the South Coles Levee field of Kern County, has made a notable contribution to drilling. Standard carried its deep prospect hole at Coles Levee to 16,246 ft., well over 3 miles deep, and then only stopped drilling because of indicated operational difficulties which might have resulted in a fishing job. The interesting feature in drilling Standard of California's deep well, which was carried 967 ft. below the previous record holder, is the fact that the hole was in perfect condition and very nearly true vertical. Drilling equipment was standard grade of good quality but not specially designed for record depth. The indicated operational difficulties assigned for the suspension of drilling means that the company felt the equipment was near the limits of durability and efficiency. Through the last few hundred feet of hole, the drill pipe had shown a tendency to stick and it required 9 hours to make a round trip. At 16,248 ft. the drill pipe could be expected to stretch from 15 to 18 ft. and was undoubtedly twisting several times in communicating the torque from the rotary table to the bit.

It is evident that California prospectors will continue an aggressive wildcat exploration program during 1945.

The most recent wildcat location is for

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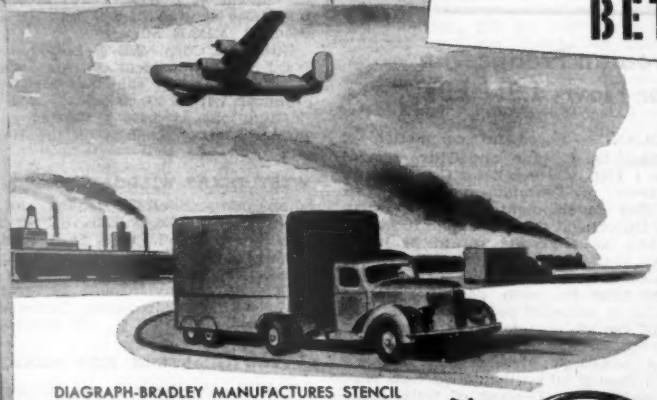

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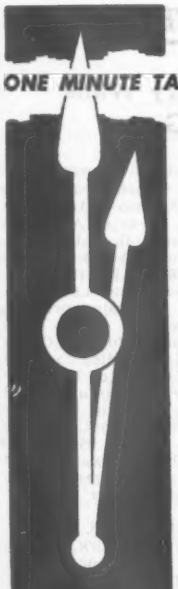

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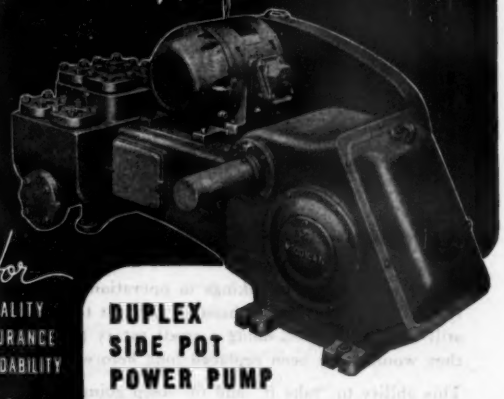

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a joint test by Richfield Oil Corp. and Sun Oil Co. which will be drilled on the Gonyer anticline about 5 miles southwest of Taft in the San Joaquin Valley. A total of 4,300 acres of government leases has been blocked and unitized. This received the approval of Secretary Ickes on December 30, which indicates no time will be lost in starting work. The companies are building roads to the location. Drilling will not start much before February 1. Shell Oil Co., Inc., and Tide Water Associated Oil Co. drilled shallow tests in this area several years ago. The Gonyer anticline presents considerable promise and if production is developed it should be large in contrast with other discoveries during the past several years.

CALIFORNIA WILDCAT COMPLETIONS

Sacramento County, Elk Grove District: Shell 1 Elk Grove, 9-7n-6e, dry in gray sand with no showings recorded, TD 1,687 ft.

Sonoma County, Petaluma district: Trico Oil & Gas Co. 1 Miller, 30-5n-6w, dry in hard sand, had gas show, TD 1,506 ft.

Los Angeles County, Puente outpost: J. C. Drilling Co. 1 Kelso, 13-2s-10w, dry in gray sand, only minor showings logged, TD 3,445 ft.

Kern County, Rosedale district: Western Gulf 44-22-A Kern County Land, 22-29s-26e, dry in hard shale, top Stevens 6,582 ft., TD 8,825 ft.

Orange County, Soquel Canyon: F. A. Cain 1 Soquel, 6-3s-8w, dry in hard sand, no showings, TD 1,025 ft.

Kern County, Tehachapi district: E. G. Cummings 1 Tehachapi, 31-32s-32e, dry in hard conglomerate which may have been basement, no showings logged, TD 1,410 ft.

Tehama County, Tehama district: Los Chicos Oil Co. 1 Scharr, 27-25n-4e, dry in hard gray sand, TD 2,051 ft.

Los Angeles County, Whittier outpost: Los Nietos Valley Oil Co. 1 Whittier, 29-2s-11w, dry in gray sand, had oil and gas showings, TD 3,605 ft.

PERMIAN BASIN

Devonian Producer in Ector Flows 1,911 Bbl.

MIDLAND. — Successful completion of Shell Oil Co. Inc. and Cities Service Oil Co. 1 TXL, western Ector County wildcat, from pre-Permian pay highlights early 1945 developments in the Permian Basin. On official potential gage it flowed 1,911 bbl. of 41-gravity oil in 24 hours through ½-inch tubing choke from upper Devonian lime pay through perforations at 7,886-8,020 ft., with gas-oil ratio of 873 to 1. It made 82 bbl. during the last hour of the 24-hour test. This new discovery touched off a spirited wildcat drilling campaign in the adjacent area when it flowed oil on drill-stem tests several months ago. Deepest of wells drilling in the area is The Texas Co. 1-B Fraser, 4 miles to the south, which is drilling at 8,145 ft. in chert.

Seaboard Oil Co. and Stanolind Oil & Gas Co. 1 Cravens, northeastern Lubbock County wildcat which plugged back to 6,170 ft. from total depth 8,800 ft. and is now testing open hole in lower Permian from 5,451-6,170 ft., swabbed down through tubing to 1,800 ft. off bottom and had a rainbow show of oil with a slight show of gas, and is being treated with acid in an attempt to develop commercial production. Norwalk Co. is preparing to drill a 6,400-ft. wildcat 4 miles north of Lubbock at its 1 Emma O'Brien, NE SE, Section 12, Block D-2. Magnolia Petroleum Co. 1 Johnson, 3 miles southeast of Idalou, is drilling below 9,554 ft.

Humble Oil & Refining Co. 1 J. R. Tucker has been staked as a south offset to same company's recent discovery pumper in Lamb County. In Bailey County, El Paso Natural Gas Co. is starting a 7,000-ft. wildcat at 1 West Texas Mortgage & Loan Co., spotted in SW SW, Section 55, Block 2, MB&B Survey.

Gulf Oil Corp. 2-B-T Edwards et al, Ward County wildcat 2 miles southeast of Monahans, is showing for a small producer with 2,600 ft. oil in hole while cleaning out at 4,400 ft., after shooting with nitro at 4,562-85 ft. in the Holt pay zone.

WEST TEXAS WILDCAT COMPLETION

Ector County: Shell Oil Co. Inc. and Cities Service Oil Co. 1 TXL, SE SE Sec. 7, Blk. 45, T-1-S, T&P Sur., 4 mi. NE Wheeler pool, IP 1,911 bbl. through ½-in. choke, gas-oil ratio 873 to 1, gravity 41, pay through perforations 7,886-8,020 ft. in upper Devonian top Ellenburger 9,980 ft., TD 10,181 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Humble Oil and Refining Co. 1 Federal-Keinath, eastern Lea County, is drilling ahead from 9,788 ft. after recovering water blanket and sulfur water on drill-stem test from 9,729-88 ft.

Neville G. Penrose, Inc. 1 Federal-Fee is a new location for a 12,000-ft. test in middle of the Penrose field, SE NW 9-22-37.

Barney Cockburn 1 Wyatt-State, indicated discovery well southeast of Maljamar field, started swabbing with 5-in. casing swung at 6,374 ft., total depth 7,020 ft.

New wildcat location 3 miles south of Dayton pool, Eddy County, is Forrest H. Lindsey 1 Lee, NW NE SW 12-19-26.

Phillips Petroleum Co. 4 Lea-Mex, Sec. 17-17-33, is drilling at 8,692 ft. in lime.

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VIKING Pump COMPANY
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EASTERN TEXAS

Three Discovery Wells Given Initial Gages

DALLAS. — Three deep discoveries in East Texas have reported completion gages. Best well of the trio is Lone Star Production Co. 1 Lee, north of Athens in Henderson County, which flowed 240 bbl. oil in 24 hours through 5/32-in. choke from perforations at 8,198-8,208 ft. in Rodessa pay, with gas-oil ratio 1,600 to 1, tubing pressure 1,545 lb., casing pressure 2,490 lb., oil 46.6 gravity.

In Van Zandt County, Humble Oil & Refining Co. 1 Bruce, 4½ miles south of Edgewood, pumped 87.63 bbl. of 37.4 gravity oil daily from perforations at 8,524-44 ft. in Travis Peak pay, and in the same county The Texas Co. 1 Stout, 2 miles southwest of Tundra, flowed 25 bbl. 44-gravity oil plus 11 bbl. salt water in 24 hours through 7/64-in. choke, gas-oil ratio 2,100 to 1, from Rodessa pay at 8,150-57½ ft.

Keith Railway Equipment Co. is entering East Texas exploration work, staking its 1 Leo Knox as a 5,000-ft. or Midway test, 5 miles west of Lovelady in Houston County, spotted 1,225 ft. from south line W. Prissick Survey, 450 ft. from northeast line Omy Weir Survey, and in the Weir Survey.

In the Manziel field, Wood County, Magnolia Petroleum Co. is preparing to deepen A-2 Herring Estate from old total depth 6,696 ft. to the Travis Peak sand.

Humble 1 Searcy, Titus County wildcat headed for Smackover lime, shutdown at 11,058 ft. for rig repairs. In Freestone County, The Texas Co. 1 McKnight is drilling below 8,497 ft. in Travis Peak shale and sand. Thus far it has logged

Travis Peak porosity at 8,233-46 ft., 8,286-96 ft. and 8,335-86 ft. indicating gas-condensate production. In east central Shelby County the Humble 1 Pickering Lumber Co. cored Pettit lime with stain and odor of oil from 6,620-68 ft. and then shut down temporarily awaiting on fuel oil.

EAST TEXAS WILDCAT COMPLETIONS

Angelina County: Humble Oil & Refining Co. 1 Angelina County Lumber Co., 10 mi. W and slight N of Lufkin, W. H. Herring Sur., elev. 304 ft., Midway 4,304 ft., Pecan Gap 5,870-6,228 ft., Austin chalk 6,632-6,942 ft., Woodbine 6,942 ft., Comanche lime 7,110 ft., dry, TD 7,212 ft. lime.

Camp County: H. S. Moss 1 Bryson and Counts (formerly 1 Nettie Bryson), 3½ mi. SE Leesburg, east edge Pittsburg field, in Robt. Wyres Sur., elev. 412 ft., base massive anhydrite 7,530 ft., top Pittsburg 8,165 ft., dry, TD 8,275 ft.

Van Zandt County: Humble Oil & Refining Co. 1 Bruce, 4 mi. S of Edgewood, J. Saligna Sur., elev. 510 ft., pumped 87.63 bbl. day, pay 8,524-44 ft. in Travis Peak; Woodbine 4,350 ft., Georgetown 5,154 ft., Paluxy 6,278 ft., massive anhydrite 7,628-7,816 ft. Pettit 8,425 (?), Travis Peak 8,500 ft.

The Texas Co. 1 J. F. Stout, 2½ mi. SW Tundra, N. T. Dickerson Sur., elev. 557 ft., IP 25 bbl. oil plus 11 bbl. salt water day, 7/64-in. choke, gas-oil ratio 2,100 to 1, gravity 44.0, pay in lower Rodessa 8,150-57½ ft., top Paluxy 6,349 ft., massive anhydrite 7,655-7,827 ft.

OHIO, KENTUCKY

Huntington and Symmes Gas Pools Extended

COLUMBUS.—The Huntington pool in Lorain County was extended a location south by Ohio Fuel Gas Co. 3 Mary H. Parker, Tract 12, Huntington Township. Clinton at 2,496 to 2,511 ft. gaged 713,000 cu. ft. of gas natural, and was shut in after shot at 3,070,000 cu. ft. with rock pressure of 1,200 lb. Two additional locations have been staked.

Ohio Fuel 2 S. C. Critchfield, Section 28, Ripley Township, Holmes County, gaged 798,000 cu. ft. natural and 1,120,000 cu. ft. after shot. The top sand was broken, but a good pay section occurred in the lower sand at 3,201-26 ft. The completion is the second well in a recently discovered pool.

The Symmes pool in Laurence County was extended a location west by a small well, Ohio Fuel 2 Irish and Riley, Section 19. Clinton sand at 3,194 to 3,209 ft. gaged 409,000 cu. ft., and was tubed without shooting.

EASTERN KENTUCKY

ASHLAND.—Completion of one oil and one gas well and one dry hole marked operations in the Eastern Kentucky area.

Kentucky-West Virginia Gas Co. completed 5567 J. Lee Ferguson, in Pike County, at 3,207 ft. with a daily open flow of 1,565,000 cu. ft. of gas from shale.

Kentucky-West Virginia Gas Co. completed 767 P. P. McCoy, Pike County, at 1,355 ft. with a daily oil production of 4 bbl. from Maxon.

Inland Gas Co. completed 267 Evans Oil & Gas Co., Knott County, at 1,579 ft. in dry Maxon.

WESTERN KENTUCKY

OWENSBORO.—Eleven wells were completed in Western Kentucky during the week in review, five oil wells, one gas well and five dry holes.

G. B. Pratt 1 Lanthrop, in 13-H-23, in Christian County, about 20 miles from production, had 150 ft. of oil in the hole, presumably from Cypress sand, at a total depth of 1,600 ft. It had not been tested. Another interesting outpost was Sun Oil Co. 1 Pinkston, NE SE 19-O-22, ½ mile northwest of Dixie, Henderson County. A strong flow of gas from Penn sand at 1,008-24 ft., estimated at 3,000,000 cu. ft. per day, blew out drilling mud. The crew was engaged in loosening stuck drill pipe. Total depth was 1,024 ft.

WESTERN KENTUCKY WILDCAT COMPLETIONS

Crittenden County: Joe Reznik 1 Woodhall, SE SE SE 7-K-20, dry at 837 ft.

Henderson County: W. F. Lacy 1 T. T. Williams, NW NE SW 4-Q-20, Aux Vases, 2,596-2,603 ft. and no Levias lime, TD 2,603 ft., pumped 35 bbl. of oil per day.

R. A. Reilly 1 Al Boswell, 1 mi. NE of Hibbardsville, dry at 2,190 ft., Kincaid 1,037 ft., Barlow lime 1,789 ft., Ste. Genevieve 1,992 ft.

INDIANA

EVANSVILLE.—Only three wells were reported completed during the week, a 40-bbl. well and two dry holes. Sun Oil Co. 1 Victor Gibson, SE SE SE 17-4s-1w, Perry County, was drilling below 3,045 ft., having topped Trenton lime at 2,865 ft. Bristol Hackbusch 1 Joe Goedde, NE NE SW 24-5s-12w, Posey County wildcat, was tested in Cypress sand at 2,363-78 ft., total depth 2,820 ft., but the showing was relatively small.

The big job is producing aviation gasoline. This big Elliott blower is one of the largest in that service. It has a capacity of 50,000 c.f.m. free air, discharging at 15 lb. gage, supplying air for catalyst regeneration in a fluid catalyst cracking process. It is driven by a 3500-hp. multi-valve condensing steam turbine—also Elliott.

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N. CENTRAL TEXAS

Texas Co. Well Extends Sivels Bend Pool

WICHITA FALLS.—The Texas Co. 1 Beasley, second producer in the new Cooke County pool north of Sivels Bend, and nearly a mile southwest of the discovery well, flowed 152 bbl. of 43.6-gravity oil through ½-in. choke in 8 hours from Strawn sand through perforations 6,817-37 ft. The gage was made after being shut in for 48 hours, and during the test the flow decreased from 57.75 bbl. the first hour to 6.56 bbl. the eighth hour, with tubing pressure dropping from 400 to 225 lb.

In Grayson County, Pure Oil Co. 1 Little is trying for drill-stem test at 9,030 ft., where it is believed still in the Pennsylvanian section. Hard sand at 8,930-9,030 ft. indicated a possible show of oil.

Archer, Cooke and King counties gained new wildcat locations during the week. In King County, Humble Oil & Refining Co. staked 1 L. K. Johnson, 990 ft. from south and 660 ft. from east line Section 44, F. P. Knott Survey, 17 miles northeast of Guthrie, for a 6,500-ft. test. S. D. Johnson 1 A. B. Edwards, in Archer County, was spotted in NE SW SW Section 37, Madison County School Land Survey, 2½ miles northwest of Scotland, to drill to 6,000 ft., while in Cooke County, Benson Brothers Drilling Co. 1 Herman Dangelmayer was started as a 3,500-ft. test in NW¼ of Block 6, F. Hughes Survey, 5 miles northwest of Muenster.

In the Murray pool, Throckmorton County, a good dual completion is Standard Oil Co. of Texas and Hanlon-Buchanan, Inc., 2 Donnell, Section 2363, TE&L Survey, flowing 315 bbl. in 6 hours from Caddo lime pay at 3,791-3,804 ft., and 527 bbl. in 6 hours from Mississippian lime pay at 4,505-16 ft.

NORTH CENTRAL TEXAS WILDCAT COMPLETIONS

Archer County: L. T. Burns 5-A J. M. Powell, Blk. 116, J. Harris subd., 4 mi. NW Archer City, TS 2,728 ft., dry, TD 2,750 ft.

A. R. Dillard et al 2 Mrs. Anna L. Herndon, Sec. 1, SPRR Sur. A-434, 6½ mi. SW Mankins, dry, TD 1,650 ft.

Cooke County: Benson Bros. 1 "Fleitman" Dangelmayer, Lot 6, T. Scott Sur. A-900, ½ mi. NE Muenster, dry, TD 2,091 ft.

Benson Bros. 1 J. W. Welch, W. M. Ross Sur. A-553, 8 mi. NE Muenster, dry, TD 1,502 ft.

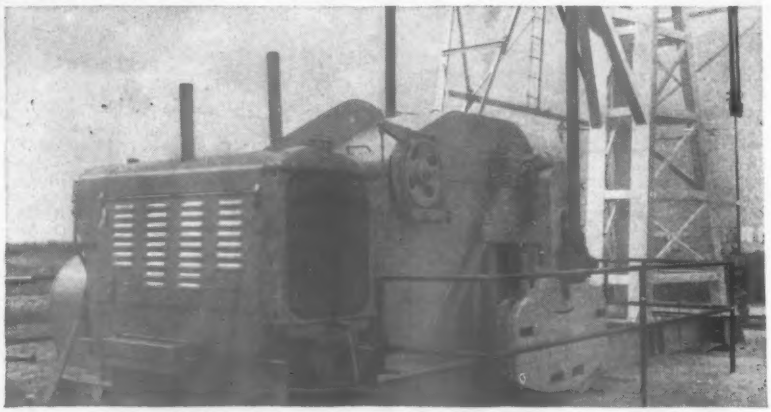
G. E. Kadane & Sons 1 G. C. Cartwright, B. J. Thompson Sur. A-1003, 3 mi. SW Lindsey, dry, TD 2,170 ft.

The Texas Co. 1 Beasley, J. McKerley Sur. A-639, ¾ mi. SW of Sivels Bend discovery well, perf. csg. opposite Strawn oil sand 6,817-62 ft., IP 152 bbl. 8 hr. through ½-in. choke, 43.6-gravity, TD 6,904 ft.

Jack County: Hanlon-Buchanan, Inc., 1-B Johnson Bros., Blk. 2, BS&F Sur. A-2390, 8 mi. SE Bryson, dry, TD 5,445 ft.

Wise County: R. B. Campbell et al 1 F. F. Kaker, R. Coleman Sur. A-158, 2½ mi. SE Bridgeport, dry, TD 4,208 ft.

Young County: Standard Oil Co. of Texas and Republic Natural Gas Co. 1 M. K. Graham, SE cor. Blk. 1, J. Poitevent Sur. A-277, 10 mi. NE Graham, Caddo 4,115 ft., Miss. lime 5,100 ft., dry, TD 5,175 ft.



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Diesel Applications. Sounds an alarm only . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . . closes magnetic fuel valve and opens pilot relay.

Battery Ignition Applications. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

Magneto Ignition Applications. Sounds an alarm only . . . grounds dual magneto . . . grounds magneto only . . . grounds magneto and sounds an alarm or lights a signal light.

Dual Ignition Applications. Opens battery circuit and grounds magneto.

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PENN AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

MICHIGAN

Deep River's Spotty Performance Continues

SAGINAW.—The Deep River pool's rule of "either gusher or duster" continues to hold true with the week's six completions in the Arenac County field. Last week's score was: One producer with an initial potential of 4,800 bbl. a day in Section 8; a dry hole in Section 8, one 1,320-bbl. well in Section 16, and three dry holes in that section.

Isabella County's Coldwater field came up with three more good producers, meanwhile, as the state Oil Advisory Board announced it will consider putting that pool under proration.

Included in the most recent completion report was an important extension for the Essexville pool in Bay County. The test, by United Drillers & Producers, Inc., in Section 16, Hampton Township, flowed 160 bbl. a day after acid treatment.

MICHIGAN WILDCAT COMPLETIONS

Allengan County, Salem Township: Harris Oil Co. 1 Berens, communitized, SE SE NW 19-4n-13w, dry in Traverse, TD 1,630 ft.

Clinton County, Lebanon Township: H. L. Wadsworth-H. M. McClure 1 James O'Connell, SE SW SE 4-8n-4w, dry in Monroe, TD 3,121 ft.

Genesee County, Forest Township: Hugh H. Heinig 1 Dan McCarty, SE SE SW 11-9n-8e, dry in Berea, TD 1,555 ft.

Kent County, Gaines Township: Oil Producers, Inc., 1 F. and M. Raymer, SW SW SW 14-5n-11w, dry in Traverse lime, TD 2,051 ft.

Isabella County, Deerfield Township: C. W. Collins-Monroe Marks 1 Fedewa, SW NW SW 3-14n-5w, dry in Monroe, TD 3,723 ft.

Nottawa Township: Gordon Oil Co. 1

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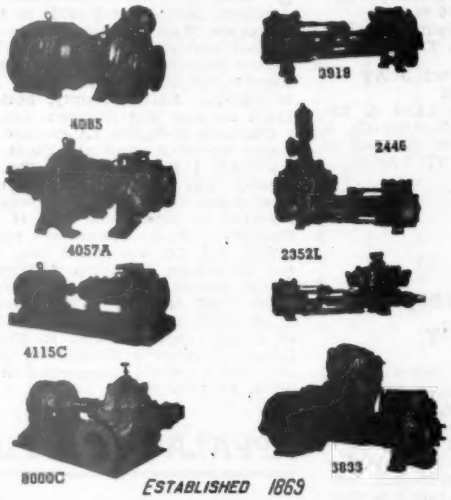

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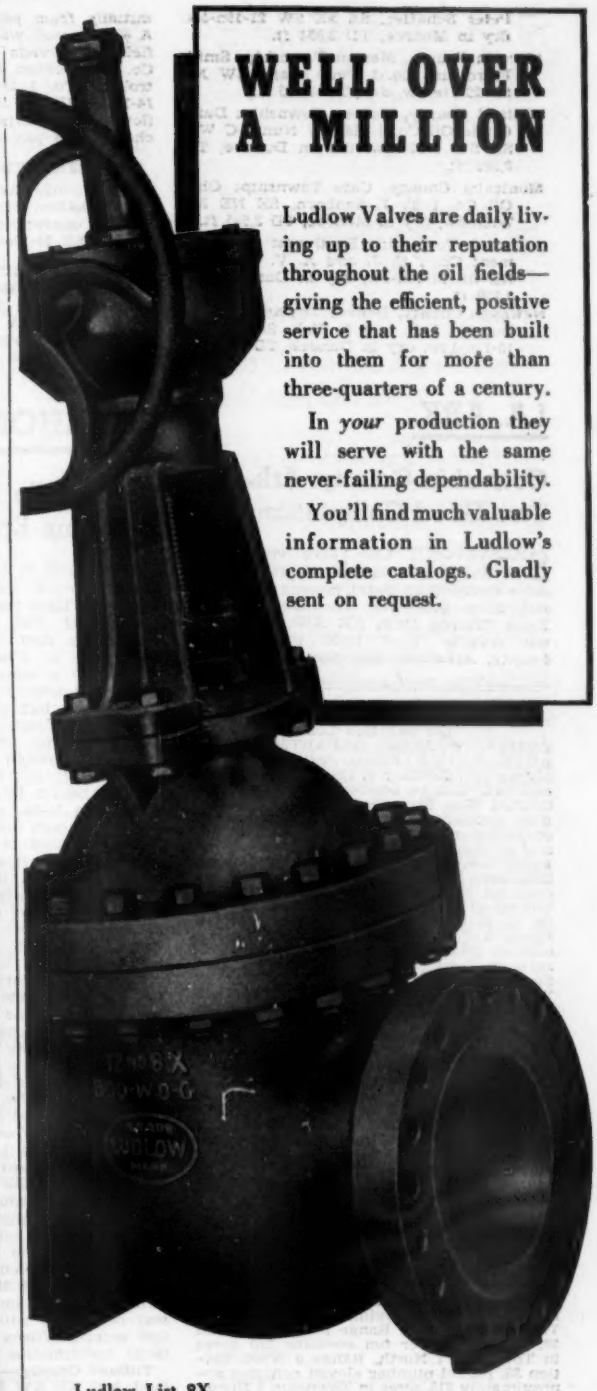

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O-1

The LUDLOW VALVE MFG·CO·INC· SINCE 1866 TROY·N·Y·

Peter Schaffer, SE SE SW 21-15n-5w, dry in Monroe, TD 3,854 ft.

Mecosta County, Morton Township: Smith Petroleum Co. 1 Paul Ream, SW NE SE 29-14n-8w, dry, TD 1,365 ft.

Midland County, Warren Township: Daily Crude Oil Co. 1 Harvey Nunn, C W½ SE SW 7-16n-2w, dry in Dundee, TD 3,966 ft.

Montcalm County, Cato Township: Ohio Oil Co. 1 T. J. Sanborn, SE NE NE 7-12n-8w, dry in Monroe, TD 3,595 ft.

Crystal Township: Southwest Development Co. 1 C. J. and A. V. Noll, NE NE SE 31-10n-5w, dry in Dundee, TD 3,159 ft.

Newaygo County, Denver Township: E. L. Bourret 1 C. and L. Yob, SE SE NE 16-14n-14w, dry in Dundee, TD 2,776 ft

LA.-ARK.

Columbia County, Ark., Has Two Good Completions

SHREVEPORT, La.—Three completions in Arkansas and one in North Louisiana summed up developments in the two-state area. Tidewater Associated Oil Co. 1 Davis Church Unit, NE NW 17-18-19, in the Atlanta West field in Columbia County, Arkansas, was good for 152 bbl.

LEGAL

Oil and Gas Lease

UNITED STATES DEPARTMENT OF AGRICULTURE, Forest Service, Jackson, Mississippi, January 9, 1945. Sealed bids in duplicate will be received until 2:00 P.M., Central War Time, February 9, 1945, and then publicly opened offering bonus for operating rights in connection with gas and oil leases on fifteen parcels of national forest land located in Scott and Wayne Counties, Mississippi. Parcel number one contains approximately 2,354 acres in Township 6 North, Range 8 East, Sections 12, 13, 24 and 25; and Township 6 North, Range 9 East, Sections 19 and 30. Parcel number two contains approximately 2,531 acres in Township 6 North, Range 9 East, Sections 19, 20, 28, 29, 30, 31, 32 and 33; Township 5 North, Range 9 East, Sections 3, 4 and 10. Parcel number three contains approximately 1,978 acres in Township 5 North, Range 9 East, Sections 2, 3, 10, 11, 12, 13 and 14. Parcel number four contains approximately 2,364 acres in Township 5 North, Range 9 East, Sections 23, 24, 25, 26, 35 and 36. Parcel number five contains approximately 2,339 acres in Township 8 North, Range 6 East, Sections 3, 4, 9, 10, 11, 14 and 15. Parcel number six contains approximately 2,257 acres in Township 8 North, Range 6 East, Sections 22, 23, 24, 25 and 26. Parcel number seven contains approximately 2,031 acres in Township 8 North, Range 6 East, Section 36; Township 8 North, Range 7 East, Section 31; Township 7 North, Range 6 East, Section 1; Township 7 North, Range 7 East, Sections 5, 6, 7, 8, 9, 17 and 18. Parcel number eight contains 160 acres in Township 7, North, Range 9 West, Section 21. Parcel number nine contains approximately 599 acres in Township 7 North, Range 9 West, Section 28. Parcel number ten contains 240 acres in Township 7 North, Range 9 West, Section 33. Parcel number eleven contains approximately 315 acres in Township 7 North, Range 9 West, Section 34. Parcel number twelve contains approximately 680 acres in Township 7 North, Range 9 West, Sections 34 and 35. Parcel number thirteen contains approximately 680 acres in Township 7 North, Range 9 West, Section 36. Parcel number fourteen contains approximately 478 acres in Township 6 North, Range 9 West, Section 1. Parcel number fifteen contains approximately 398 acres in Township 6 North, Range 9 West, Section 2. Separate bids will be received on the fifteen parcels. Award of lease will be made only to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms and operating regulations from the Forest Supervisor, Masonic Building, U. S. Forest Service, Jackson 114, Mississippi.

initially from perforations at 8,283-87 ft. A 40 bbl. well was completed in the Troy field in Nevada County, Berry Asphalt Co. B-1 Jackson, in 9-14-20. Magnolia Petroleum Co. 1 Booth Barren, in NE SE 14-17-19, Village field, Columbia County, flowed 162 bbl. per day through 11/64-in. choke from pay at 7,360-63 ft.

ARKANSAS WILDCAT COMPLETIONS

Miller County: Arkla Oil 1 Dodd, SW NW 11-19s-28w, dry, TD 6,810 ft.

Union County: Root Petroleum 1 McRae, SW SE 16-16s-18w, dry, TD 6,950 ft.

NORTH LOUISIANA WILDCAT COMPLETION

Rapides Parish: Louisiana Land & Exploration 1-A Bentley Lumber Co. 2, 3,083 ft. south and 2,420 ft. west of NE cor. 25-5n-5w, dry, TD 7,200 ft.

OKLAHOMA

Bartlesville Discovery Performs Erratically

HIGH spot in Oklahoma developments this week was the performance of the O. G. Harp Poultry & Egg Co. 1 Matthesen, NE NW NE 19-10n-2w, east of the Moore pool. This well had Bartlesville sand at 7,568-7,608 ft., and earlier had made a sensational drill-stem test. This week when opened, it failed to flow water load, but when this was replaced with an oil load, started flowing 74 bbl. per hour. The first 13 hours it flowed 871 bbl., through chokes varying from ¼ in. to ¾ in., made 1,315 bbl. in the first 24 hours; then 249 bbl. in 13 hours through a ¼-in. choke, followed by 110 bbl. in 18 hours through same-sized choke. Tubing seemed to display signs of clogging up and after the flow declined to 5 bbl. per hour, the well was shut in.

Canadian County.—Amerada Petroleum Corp. 1 Lawson, NE SE NW 18-11n-5w, after failing on tests in the Hunton, drilled to 8,911 ft., and is shut down after running electric log.

Cleveland County.—Magnolia Petroleum Co. 1 Anneler, SW NE 26-6n-1w, is drilling in Viola lime at 6,618 ft., with top not called, but considered high. Two drill-stem tests in the Bartlesville were disappointments.

Kiowa County.—Pure Oil 1 Hinton, SE NE NW 10-7n-17w, northeast of the Hobart pool, flowed 276 bbl. of 38°-gravity oil in 4 hours from Cisco sand at 1,728-56 ft., through a 1-in. tubing choke.

Oklahoma County.—Gulf Oil Corp. 1 Beck, SW SW SW 15-14n-2w, which had second Wilcox sand at 6,175-6,203 ft., set pipe and ran tubing for a test, but encountered only salt water. It will plug back and test the Hunton.

Phillips Petroleum-Kerlyn Oil Co. 1 Classen, NW SE 22-12n-4w, southeast of Bethany, fished out dropped tubing and was rerunning with packer, allegedly to test second Wilcox sand at 7,756 ft. Official confirmation was lacking.

Tillman County.—Gulf Oil Corp. 1 Copeland, N/2 NE NW 31-1s-18w, will be completed as a pumping well from Simpson sand at 4,568-73 ft. It flowed 31 bbl. through casing, but swabbed only 69 bbl. in 10 hours through tubing.

Washita County.—Sinclair Prairie Oil Co. 1 Bishop, NE NE NW 31-8n-19w, completed fishing job and is preparing to make drill-stem test of strong gas flow in granite wash at 6,900 ft.

West Edmond.—Pipe-line runs averaged 46,250 bbl. per day this week from 314 connected wells, an increase of 750 bbl. and 5 wells. Continental Oil Co. 2 Johnson, NW NE 9-14n-4w, in the heart of the field, flowed 575 bbl. of oil and 2,000,000 cu. ft. of gas from the Bois d'Arc in 90 minutes.

MISSISSIPPI

Heidelberg Field Yields Three Oil Completions

JACKSON.—Several completions were reported in Mississippi but none in Alabama, Georgia or Florida in the week in review. Two Mississippi tests are considered hopeless and are expected to add to the failures in the state. These are Humble Oil & Refining Co. 1-A Stowers in 9-8n-2w, Adams County, bottomed at 12,012 ft., and Mid Southern Drilling Co. 1 Clark, in 13-8n-17e, Lauderdale County, which was shut down at 3,290 ft.

Humble 1 Evans, in 15-2n-18w, Marion County, was given a drill-stem test at a total depth of 9,079 ft. The recovery was reported to have been 1,600 ft. of condensate-cut mud. Coring was resumed.

Fohs Oil Co. completed two wells in the Heidelberg field. No. 1 Eddy in 33-1n-13e, started at 130 bbl. swabbing, total depth 5,056 ft., and 1 Eddy-Heidelberg in 32-1n-13e, pumped 186 bbl. in 24 hours at a total depth of 5,091 ft. Frank and George Frankel 2 Heidelberg, in 19-1n-13e, was a 100-bbl. completion at a total depth of 4,983 ft.

APPALACHIAN FIELD

Devonian Low in Chestnut Ridge Test

PITTSBURGH.—On Chestnut Ridge in Wharton Township, Fayette County, New Penn Development Co. et al topped the Oriskany sand at 7,638 ft. and at 100 ft. in that member is void of showing. With a surface elevation of 2,316 ft., the Onondaga chert was logged at 7,491 ft., placing the lower Devonian low on structure compared to west flank tests.

In German Township, Fayette County, Orville Eberly et al deepened the test on A. L. Sharpnack farm from the coal where it had been a good gas well until depletion and in the Gantz sand 1,878-1,931 ft., a gage of 700,000 cu. ft. gas was struck. 1,896-1,903 ft. It was bottomed at 1,947 ft.

In Boone County, Owens Libby Owens Gas Department completed 699 Siler Coal Land Co. in Peytona district in the Big lime topped at 1,702 ft. as a good gas well gaging 1,919,000 cu. ft. with a total depth of 1,876 ft.

Columbian Carbon Co. completed 737 Island Creek Coal Co., Logan County in the Big lime good for 1,525,000 cu. ft. gas, extending the pool.

Ohio Oil Co. 1 Kuykendall et al, a wildcat in the Dry Fork district, Tucker County, has resumed drilling at 1,990 ft. This company's test at West Virginia Seneca State Park in Huntersville district, Pocahontas County, shutdown at 614 ft. for the holidays and has been delayed resuming on account of weather.

LEGAL

UNITED STATES DEPARTMENT OF AGRICULTURE Farm Security Administration, Montgomery, Alabama, January 8, 1945. Sealed bids in duplicate will be received until 2:00 P.M. CWT, February 12, 1945, and then publicly opened, offering bonus for operating rights in connection with gas and oil leases on lands located in Coffee and Geneva Counties, Alabama, containing 15,462.58 surface acres (pro-rata rights 12,510.54 mineral acres), being portions of the FSA Coffee Farms Project. Permission to conduct geological examinations prior to date of bid opening may be obtained upon request.

Additional detailed information and bid forms should be requested from the Regional Business Manager, Montgomery, Alabama.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended Jan. 6, 1945					Cumulative total, 1945				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	0	0	0	0	0	0	0
Indiana	0	0	0	0	0	0	0	0	0	0
Illinois	3	0	0	5	8	3	0	0	5	8
Kentucky	1	0	0	2	3	1	0	0	2	3
Michigan	0	0	0	6	6	0	0	0	6	6
Kansas	1	0	1	8	10	1	0	1	8	10
Neb., Mo., Iowa	0	0	0	1	1	0	0	0	1	1
Oklahoma	0	0	0	0	0	0	0	0	0	0
Texas:										
North Central	0	0	0	8	8	0	0	0	8	8
West	1	0	0	0	1	1	0	0	0	1
Panhandle	0	0	0	0	0	0	0	0	0	0
Eastern	2	0	0	2	4	2	0	0	2	4
Gulf Coast	0	0	0	7	7	0	0	0	7	7
Southwest	0	0	0	4	4	0	0	0	4	4
Total Texas	3	0	0	21	24	3	0	0	21	24
Louisiana:										
Northern	0	0	0	1	1	0	0	0	1	1
Southern	0	0	0	0	0	0	0	0	0	0
Total Louisiana	0	0	0	1	1	0	0	0	1	1
Arkansas	0	0	0	2	2	0	0	0	2	2
Mississippi	0	0	0	0	0	0	0	0	0	0
Ala., Ga., Florida	0	0	0	0	0	0	0	0	0	0
Montana	0	0	0	0	0	0	0	0	0	0
Wyoming	1	0	0	1	2	1	0	0	1	2
Colorado-Utah	0	0	0	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0	0	0	0
California	0	0	0	9	9	0	0	0	9	9
Total United States	9	0	1	56	66	9	0	1	56	66
Total previous week	9	1	3	65	78					

Drilling Scheduled for Two North Carolina Tests

HOUSTON. — Floyd Carsten, oil operator of this city, is now shipping rigs from Texas to North Carolina to begin drilling at two sites, of 5,000-ft. tests. Early in 1944, a group of North Carolina citizens, headed by Maj. Matt Allen and Eli Perry, both of Kinston, and incorporated as Coastal Plains Co., made application and received a concession for the prospecting of state-owned lands in the northeast portion of the state. All state lands within an area 50 miles square were included in the lease. Terms called for the drilling of at least one oil test to a depth of 5,000 ft. or basement rock within 18 months. All lands included in the original claim were tidelands in the flat peneplain portion of the state.

Shortly after Coastal Plains Co. received its concession, Standard Oil Co. (N.J.) applied for and received a lease covering the submerged lands of a large area lying to the south of the Coastal Plains concession. Through a ruling of the Supreme Court in 1937, the state of North Carolina had been awarded the oil rights for submerged lands, including offshore deposits.

Like the Coastal Plains concession, the Standard of Jersey lease called for drilling a 5,000-ft. test. The area is being mapped by geophysical means under supervision of K. D. White, geologist, of Richmond, Va.

Considerable leasing followed the Standard Oil venture. Coastal Plains Co. acquired the lease of submerged state lands in smaller areas to the south of the Standard area. These lands have since been subleased to Carsten, who will shortly commence drilling.

Nearly all major companies are engaged in leasing privately owned lands in the state's coastal counties, and while interest is high, it is merely a part of the leasing now general from Maryland to Florida.

Nixon Not Affiliated With Tennessee Gas Concern

In The Oil and Gas Journal of December 30 Maston Nixon, Corpus Christi, vice president Southern Minerals Corp., was inadvertently referred to as representing Tennessee Gas & Transmission Co. at a gas-conservation conference in Austin. Nixon is not attorney for that company and at no time has had any connection with it.

Gas-Turbine Session Planned by Power Group

CHICAGO. — The eighth annual meeting of the Midwest Power Conference will be held April 9 and 10, 1945, at the Palmer House in Chicago, it has been announced by Stanton E. Winston, conference director.

A session on the gas turbine will be included in the program for the first time, Winston said. Other sessions being planned will deal with industrial power plants, feedwater treatment, recent developments in heating, recent developments in air conditioning, fuels and combustion, central station practice, postwar load planning, diesel power, and hydro power.

Three electrical sessions, the all-engineers' dinner, and the joint luncheons with the American Society of Mechanical Engineers and the American Institute of Electrical Engineers complete the preliminary program.

A.S.M.E. Establishes New Petroleum Division

NEW YORK.—A new petroleum division of American Society of Mechanical Engineers has been launched under the chairmanship of William Raisch, consulting engineer, of this city. Its purpose is discussion and solution of mechanical problems of various branches of the oil industry. At a recent meeting here it was disclosed that thousands of such problems develop.

Six subcommittees were appointed covering the following aspects of the industry: Production and drilling, refining, transportation, equipment manufacturers, materials, and application and use of petroleum and its products.

The new petroleum division is anxious to contact oil men interested in the mechanical problems of the industry, according to Raisch. Headquarters of the A.S.M.E. are at 39 West Twenty-ninth Street, New York.

CALENDAR

January 1945

PIWC, January meeting, New Interior Building, Washington, January 15-17.

I.P.A.A., special meeting of executive committee and state vice presidents, Biltmore Hotel, Oklahoma City, January 29-30.

February

American Society of Lubrication Engineers, first national convention, Stevens Hotel, Chicago, February 8-9.

April 1945

American Gas Association, annual conferences of technical section, Stevens Hotel, Chicago, April 4-6.

Midwest Power Conference, eighth annual meeting, Palmer House, Chicago, April 9 and 10.

I.P.A.A., midyear directors meeting, New Orleans, La., April 16-18.

October 1945

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 4-6.

I.P.A.A., annual membership meeting, convention city to be selected later, October 15, 16 and 17.

WORTH WAITING FOR BUT NO WAITING IS NECESSARY

'BESTOLIFE—the Lead Seal Joint Compound used successfully in the Drilling and Refining industries for years—is immediately available through more than 100 distributors in the U.S.A. Any priority rating will do.

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LOS ANGELES 1, CALIFORNIA

The Simplex Jenny Makes Tough Pulling Jobs Easy

The Simplex Jenny Center Hole Hydraulic Puller has ample power to enable one man to pull stubborn bushings, pistons (pictured), cylinder liners, wrist pins, valve seats, keys, wheels, sprockets, gears, boiler tubes, pipes, etc. Also pushes or lifts and can be readily set up as a portable press. Bulletin 43J.

Five models; capacities 30 to 100 tons.

Simplex
LEVER SCREW - HYDRAULIC
Jacks

Templeton, Kenly & Co.
Chicago (44), Illinois
Better, Safer Jacks Since 1899

Among the

Drilling Contractors

Ralph Perry has been awarded drilling contract on the Fox Hole Oil Co. 1 Ed & H. Harmsen, in NW NE SE 29-4n-14w, Allegan County, Michigan.

American Drilling Co. is the drilling contractor on the Michigan Oil Co. 1 George Barnes, in NW SE SW 14-19n-3e, Arenac County, Michigan.

E. W. Leeder will drill on contract the Fox Hole Oil Co. 2 Jacob Geerlings, in NE NW SE 34-5n-15w, Ottawa County, Michigan.

H. R. Miller is the contractor on the E. L. Bourret 2 Oliver & Marguerite Schaap, in NW NE SE 34-5n-15w, Ottawa County, Michigan.

R and S Drilling Co. has been organized by H. E. Roberts and Johnny Strand. The new company will purchase a rotary rig from I. F. Scott, and is scheduled to start drilling in the Evart, Michigan, gas field.

M.-B.-K. Drilling Co. has been awarded drilling contract on the Richfield Oil Co. 1 J. O. Dodson, in Section 579, Block 97, H&TC Survey, in a section which straddles the Borden-Scurry County line, Texas. The wildcat is slated to go to 3,500 ft., and was to start as soon as rotary could be moved in.

Loffland Brothers Co. has been awarded drilling contract and was building roads and moving in materials to the Pure Oil Co. 2 C. S. Hopkins, in C NW NW 21-6s-9w, Gulf County, Florida.

Nabors Drilling Co. has the drilling contract on the Union Producing Co. 1 F. T. Withers estate, in Desota County, Mississippi, and was building roads. Location is in Section 18-2s-9w, 687 ft. east and 3,514 ft. north of the southwest corner.

Crescent Drilling Co. was rigging up preparatory to drilling the Carter Oil Co. 1 W. G. Davis, in NE NE 15-3n-4w, Hinds County, Mississippi.

Bullington & Holloway, contractors on the Wanete Oil Co. and Richard Lack 1 J. F. Craig, in C SW NE 32-7n-14e, Lauderdale County, Mississippi, was moving in materials.

Hewgley Drilling Co., contractors on the Sun Oil Co. 1 Leon Boyd, in NW NW NE 15-6n-8w, Lincoln County, Mississippi, was waiting on rig.

Cook Drilling Co. was rigging up on its contract to drill the Carter Oil Co. 1 Alfred Howard, in C SW NW 31-11n-4e, Madison County, Mississippi.

F. L. Lanahan has been awarded the drilling contract on the Rock Hill Sand & Gravel Co. 1 Rouse, in SW SW SW 9-2n-3e, Garvin County, Oklahoma. The location is near Sinclair Prairie's Allred discovery area. Test will go to the Arbuckle.

Olson Drilling Co. has the contract to drill the Pure Oil Co. 1 Central Life (Pruitt ranch) in SW NE NW 26-3s-1e, in the North Caddo area of Oklahoma. Location is near Pure's pool discovery in Carter County. Contractor was rigging up on the 5,500-ft. test.

Gillespie & Lobaugh has the drilling contract on the Sunray Oil Co. 1 Robedeaux, in SW NE NW 22-22n-1e, in the East Otoe area of Oklahoma, which was drilling at 3,260 ft.

Drilling contractors face their hardest job of the war in meeting the demand of the Petroleum Administration for War for 27,000 wells in 1945, according to Howard P. Holmes, Dallas, president of American Association of Oilwell Drilling Contractors. This number is an increase of 3,000 over the 24,000 wells sought by PAW for 1944 and which PAW estimates will be met within 1 per cent. Steel and manpower problems beset the path for contractors early in the year, Holmes points out, predicting that both will be tighter during the first half year than the industry has yet seen.

Increased military demand for shells, bombs and rockets, which are made from tubular goods, and the possibility for sufficient manpower to meet military demands

are foreseen by Holmes, who urged drilling contractors to perfect their labor deferment records.

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Call JOHN FIELD-MAN ON YOUR NEXT WATER CONDITIONING JOB

LELAND HAMNER CO.

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New ELECTRODE HOLDER

Stubby

- LIGHTER
- EASY TO WORK
- WORKS COOLER
- LOWERS MAINTENANCE
- CUTS ROD COST 14%

Stubby weighs 14 oz. 6¼" long, 1¼" diam., 300 amp.

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UNIBOLT "BIG INCH" COUPLINGS

Are more widely used on pump suctions than any other connection. There must be a reason!

UNIBOLT

(TRADE MARK REGISTERED U. S. PATENT OFFICE)

THE ONE BOLT COUPLING

THORNHILL-CRAVER COMPANY—HOUSTON

MARKET QUOTATIONS

Prices as of January 9, 1945

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b plant in tank cars and in cents per gallon.)

REFINERY GASOLINE

Octane (A.S.T.M.)	76†	70-74
Mid-Continent*	6.75	5.87½
Gulf Coast	6.75	5.82½
Northeast Coast		9.07½
California		6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R (research method).

NATURAL GASOLINE

Grades:	26-70	18-58
Oklahoma (Group 3)	4.75@	5.70@
North Texas (Dist. 1 Del.)	4.50@	5.40@
North Texas (f.o.b. plant)	4.37½	5.25@
North Louisiana (Dist. 1 Del.)	5.16@	6.06@
North Louisiana (f.o.b. plant)	4.37½	5.25@
California	4.87½	5.50@

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.33
Conroe	1.41
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.93
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.00

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity:	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.08	$0.70
20-20.9	.88	$0.85	1.06	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended December 30, 1944

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Distillate	Stocks: Residual
East Coast	709	12,458	8,961	7,070
Appalachian	149	4,316	663	571
Ill., Ind., Ky.	796	10,624	6,163	3,166
Okla., Kan., Mo.	395	8,442	2,102	1,458
Inland Texas	242	2,774	392	670
Tex. Gulf Coast	1,172	15,197	6,928	9,557
La. Gulf Coast	271	4,799	1,794	1,233
North La., Ark.	85	2,498	706	221
Rocky Mountain	126	1,772	365	523
California	853	15,734	10,421	32,961
Total 12-30-44	4,798	86,614	39,495	57,430
Total 12-23-44	4,682	83,365	40,846	58,509
Total 1- 1-44	4,471	75,327	41,728	56,773

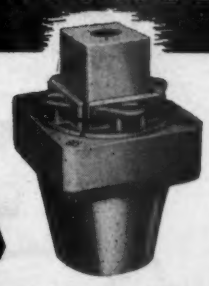
CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended—	Bbl. of crude*
December 30, 1944	222,998,000
December 23, 1944	222,575,000
January 1, 1944	240,992,000

*Excludes unrefinable California stocks.

DRIVING TORQUE CUSHIONED WITH



BJ KELLY BUSHING

Bushing Body is a solid, one piece unit with a corrugated inner core. An oil resistant synthetic rubber cushion absorbs the shock of drilling torque. Bushing is equipped with four slips inside the rubber cushion, faced with liners made of anti-friction material. These liners take all the wear and are reversible for long economical life. Ask the BJ man or see your supplier.

BYRON JACKSON CO.

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PENBERTHY "REFLEX" WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.

DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

PERSONALS

Another Upward Step Lands Him Near Top

F. B. BIMEL has been elected a vice president of International Petroleum Co., Ltd.

A director of International Petroleum since 1928, Bimel has been associated with the producing and pipe-line end of the oil industry during his entire business career.

In 1904 he joined the Prairie Oil & Gas Co. in Kansas City as general foreman of pipe-line construction, and superintended the laying of the first pipe line east from the Mid-Continent field. Following the line as it moved east, he was transferred to the Ohio Oil Co. and later to the Illinois Pipe Line Co.

On completion of the line to Bayway, N. J., Bimel joined Standard Oil Co. of Louisiana in 1909. In 1915 he was made producing assistant in the Caddo district field in northern Louisiana, 3 years later taking charge of the gasoline department. Transferred to Standard Oil Co. (New Jersey) in 1922, he organized a system of recovery of light ends which played an important part in the oil industry's conservation program. He joined International Petroleum as a director in 1928.

Col. Frank Lovering, who was on military leave from Shell Oil Co., Inc., has returned to service with the company as district superintendent at Quitman, Tex. Colonel Lovering was called into service with the Coast Artillery at Camp Beauregard, La., in March 1941 as a captain. The next year he was made camp intelligence officer at Camp Davis, N. C. Later he was promoted to lieutenant colonel. His unit was abandoned and he returned to inactive status.

George Card, who was assistant superintendent of production for Stanolind Oil & Gas Co. in its West Texas-New Mexico division, with headquarters in Fort Worth, was promoted January 1 to superintendent. He succeeds **J. H. Moyar,** who retired after 23 years' service. Card graduated in petroleum engineering from Stanford University. His former post has been taken by **T. H. Andrews,** of Houston, who was district superintendent of production in the Gulf Coast area. Moyar has an interest in a 40,000-acre ranch near Utica, Mont., and he will devote his entire time to ranching. At a farewell dinner he was presented with a hand-made saddle.

Marion F. Munro, Sun Oil Co., was elected president of Petroleum Accountants Society of Dallas at the annual meeting. Other officers chosen are: Vice president, **Wallace W. March,** Drilling & Exploration Co.; secretary, **Paul L. Barr,** Hummack Oil Co.; treasurer, **C. J. Crissman,** Trinity Drilling Co.; program director, **M. O. Dickenson,** E. B. Cox & J. L. Hamon; publicity director, **V. B. Mondy,** Trinity Gas Corp.

R. G. Follis, vice president and director of Standard Oil Co. of California, has been appointed assistant to the president, **H. D. Collier.** His new duties will be discharged in addition to his present ones.

William J. Murray, Jr., of Houston, has been named to head a committee of petroleum engineers who will aid the Texas Railroad Commission in a program designed to prevent waste and conserve natural gas in Texas fields. Murray formerly was on the commission's staff, leaving it to enter the service of Petroleum Administration for War.

C. M. Himel, who recently joined Phillips Petroleum Co.'s chemical products department, will be connected with the research department at Bartlesville, Okla. He received his Ph.D. degree from University of Illinois.

J. H. Puls, formerly division engineer for The Texas Co., Los Angeles, has been promoted to superintendent of drilling and exploration. His place was filled by **William Clark,** formerly district engineer at Fellows, Calif. **Tom Bell** was promoted to district engineer to succeed Clark.

Ion Edeleanu has severed his connection with Universal Oil Products Co. to engage in consulting work, with an office at 14 Wall Street, New York. It is understood he will help foreign refineries in handling their rehabilitation and modernization problems.

Col. Jay Taylor, oil operator of Amarillo, Tex., and **Maj. J. R. Parten,** president of Woodley Petroleum Co., Houston, have been appointed to posts in the Federal Reserve system. Colonel Taylor, named chairman and Federal Reserve agent of the bank in Dallas, recently served in the petroleum division, Office of Quartermaster General. Major Parten, named deputy chairman of the same bank, was for 2 years director of transportation for Office of Petroleum Coordinator.

E. H. Collins, manager and vice president of Standard Oil Co. of Pennsylvania, has been appointed assistant to **L. E. Ulrope,** region manager in charge of northern divisions of Standard Oil Co. of New Jersey. **W. E. Black,** assistant manager of Pennsylvania, has been promoted to manager, and **J. A. Lorimer,** merchandising assistant, has been advanced to assistant division manager.

H. D. Amos, independent oil operator, has moved from Ada, Okla., to Oklahoma City.

L. E. Winkler, president of Rock Island Refining Corp., Indianapolis, has disposed of his financial interest in Winkler-Koch Engineering Co., Wichita, Kans., and severed his official connection with that company, of which he was cofounder. He plans to devote his entire time to Rock Island.

Jack W. Goddard has joined the Midland, Tex., staff of British-American Oil Producing Co. as district landman. He formerly was with Sinclair Prairie Oil Co. and has been operating as an independent for several years.

Equipment Men in the News

Oil and Gas Law Lecture Series to Open

The South Texas School of Law's tenth annual series of oil and gas lectures in which instruction is given along practical, nontechnical lines, will be offered January 18 to May 10, at the Houston, Tex., Y.M.C.A. night school.

Some of Houston's most prominent lawyers will conduct the lectures and will cover such phases of the industry as leases, royalties, operating agreements, governmental regulations and operating rights, according to W. H. Randolph, educational director.

The course is open to both men and women. The public is invited to attend the first lecture, which will be held January 18 from 7:30 to 9:30 p.m.

Thorsteinson Vice President, National Supply Co.

Election of E. H. Thorsteinson as vice president and controller is announced by National Supply Co., Pittsburgh, Pa. Thorsteinson joined the company as controller in 1942, coming from Montgomery, Ward & Co., Chicago, Ill., where he had been assistant general controller.

New Post for Kuster

O. R. Kuster has been named chief project engineer of General American Process Equipment and is located at the New York office, 420 Lexington Avenue. Kuster has had wide experience in chemical plant design in the Netherlands, Russia, Chile and the United States, specializing in fertilizers, potash, aluminum and magnesium salts. He was formerly with The Dorr Co.

Buhler Promoted by Plomb

Promotion of J. J. Buhler, for many years field engineer of Plomb Tool Co. in the Northwest, to the position of northwestern regional director, has just been announced. Buhler is well known in automotive and industrial fields on the Pacific Coast. In his new position he will direct distribution for Oregon, Washington, Montana, Wyoming, Idaho, Utah and Colorado. His headquarters will be at Seattle.

Dieter With Darling Valve

Walter G. Dieter has been named sales promotion manager of Darling Valve & Manufacturing Co., Williamsport, Pa. He will direct the company's merchandising activities on industrial valves, fire hydrants, oil-field valve cups and Pumcups for reciprocating pumps and hydraulic pistons.

Dieter has been with Libby-Owens-Ford Glass Co., Toledo, Ohio, in its engineering, field service and product promotion departments.

Warner Named President of Rockford Drilling Machine

A. A. WARNER

Arch A. Warner has been elected president and general manager of Rockford Drilling Machine Division of Borg-Warner Corp. at Rockford, Ill. Warner, former works manager of Mechanics Universal Joint Division of the corporation, also at Rockford, succeeds E. C. Traner, who at his own request, has retired from active management of the company to become chairman of its advisory board. Before going to Rockford in 1941, Warner was sales engineer at Detroit for Mechanics, which he joined in 1938.

Krell Advertising Manager for Globe Steel Tubes Co.

Globe Steel Tubes Co., Milwaukee, Wis., has announced the appointment of Frederick K. Krell as advertising manager. Krell is the immediate past president of the Milwaukee Junior Chamber of Commerce, and is at present chairman of the Trade Promotion Committee and state director of the Wisconsin Junior Chamber of Commerce.

Federal Brilliant Co. Makes Four Appointments

Ray Becker, recently in charge of electrical advertising sales in the Chicago district for Federal Electric Co., has been made sales manager of Federal Brilliant Co., St. Louis, Mo.

New Federal branch manager at Cincinnati is Orville F. Allen, with Federal Electric for the past 20 years and until recently head of the personnel and traffic department at Chicago.

At Indianapolis, Earl J. Michaels, takes charge as branch manager after 26 years with Federal. He leaves the credit and adjustment departments at Chicago to assume his new duties.

F. E. Cody, for 19 years with Federal, leaves his post as branch manager at Indianapolis to assume charge of the Federal Electric branch at Milwaukee, Wis.

Wilson to Manage New York Division

O. B. Wilson has been named New York industrial manager for Brown Instrument Co., precision industrial instrument division, Minneapolis-Honeywell Regulator Co. His appointment becomes effective the first of the year. Wilson has been with the Brown company for 21 years during which time he has served in several branch offices throughout the country and at the company headquarters at Philadelphia. He is being transferred from the Chicago branch where he has been industrial manager for the past several years.

J. A. Robinson has been named industrial manager of the Chicago branch of Brown Instrument Co., to succeed Wilson Robinson has been with the Brown organization 15 years.

Dunker Promoted by American Steel & Wire

Walter S. Dunker has been appointed assistant treasurer of American Steel & Wire Co., subsidiary of United States Steel Corp.

American Steel & Wire Co. operates offices in the Southwest at Houston, Dallas, Fort Worth, El Paso, Waco, Brownwood and Beaumont, Tex.

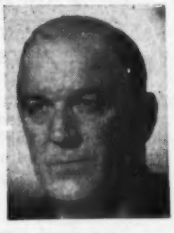
Lane-Wells Makes Changes

J. M. Walker, former district superintendent at Oklahoma City, Okla., for Lane-Wells Co., has been transferred to Tulsa, Okla., as division sales engineer. S. W. McGaha, district superintendent at Olney, Ill., has been transferred to Oklahoma City to replace Walker. Charles B. Snodgrass, Illinois district sales engineer, has been made district superintendent for Illinois, with headquarters at Salem

Ponder Joins Bucyrus-Erie

Appointment of G. E. (Bert) Ponder, Odessa, Tex., to a position in its drill sales organization was recently announced by Bucyrus-Erie Co., South Milwaukee, Wis. He will be stationed at the company's Dallas, Tex., office in charge of oil-well spudder sales in the Dallas territory. Immediately before joining Bucyrus-Erie he had been conducting his own drilling and well-servicing business at Odessa.

Tenison Heads Dallas Bank



J. C. TENISON

J. C. Tenison has been elected president of the Dallas National Bank, Dallas, Tex. Other changes made by the directors included the election of Joe Agee as executive vice president, and Roger L. Tennant as a member of the board of directors. Tenison succeeds the late Ernest R. Tennant.

Tenison has been in the banking business since 1908 starting as a runner and collector for the old City National Bank of which his father, E. O. Tenison was president.

Joe Agee started with the bank February 1, 1917, as a messenger and has remained with the institution throughout his entire business career.

Roger L. Tennant, new member of the board of directors, is a younger brother of Ernest R. Tennant.

Forbes Made Pressure Weld Co. Executive

A. L. Forbes, vice president and formerly general superintendent of El Paso Natural Gas Co., has been made vice president and general manager of Pressure Weld Co., a subsidiary concern. He is in charge of the Houston office. Forbes retains his general connection with El Paso Natural Gas Co.

Classified Advertising

RANCHES AND FARM LANDS

FOR SALE

Ranch near Walsenburg, Colorado, 90,000 Acres. Has railway through place. Has fresh water stream through ranch. Good hunting, fishing. About 50,000 A. valley land. Water to irrigate 4000 A. All fenced. 2 houses. Good roads. ½ minerals goes with land. Price $4.25 per acre.

10,000 Acres, 7 miles east of Las Vegas, New Mexico. Modern 7 room house. Good grass. Plenty of good fresh water and several mills. Barns and outbuildings. All fenced. Minerals intact. Price $5.25 per acre.

Near Roy, New Mexico, 10,000 acres deeded and 10,000 acre lease on Canadian River. Good grass. All minerals. Good fishing, hunting. Price $7.00 per acre. C. O. Walling, Box 695, Phone 306, Burkburnett, Texas.

PATENT ATTORNEYS

PATENTS, Trade-Marks, Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg., Washington 5, D. C.

HELP WANTED

WANTED: Experienced Refinery Instrument Man. Base pay $1.07 an hour, work week 48 hours, time and one-half for over time. Permanent job for right man. Box A-371, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPING DRAFTSMAN AND CHECKER. Petroleum industry. Chicago location. Experienced high pressure refinery piping layouts. Actual oil refinery piping experience desirable although not necessary. Give complete details in first letter. Box A-351, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Chemist, experienced in making complete analysis of gasoline, kerosene and other petroleum products. Essential work, salary $260.00 per month, work located in Georgia. Give all details in first letter as to age, education, experience, and small photograph. Write Box A-379, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMISTS—ENGINEERS
PHYSICISTS

Men interested in careers in industrial research are urged to write us giving details of training and experience. Essential work with promising postwar future offering opportunities for professional growth.

BATTELLE MEMORIAL INSTITUTE
COLUMBUS 1, OHIO

MEN FOR FOREIGN EMPLOYMENT
Limited number desirable positions open in Saudi Arabia:

Petroleum, electrical and mechanical engineers; radio operators and technicians; Diesel and tractor mechanics; air-conditioning and refrigeration mechanics; stabilizer operators; utility operators; surveyors; accountants; stenographers; typists. Employment offers splendid opportunities for post-war security and advancement. Liberal benefit plans; vacations in United States; free hospital and medical care. If genuinely interested in foreign career, send full information on experience, transcript of college record (professional applicants only), references, draft and availability status to our Relations Department.

ARABIAN AMERICAN OIL COMPANY
200 Bush Street
San Francisco 4, California

HELP WANTED

WANTED by consulting organization: Petroleum engineers with Hayward mud logging experience or its equivalent. Immediate openings in Venezuela, excellent opportunity for advancement to managerial positions throughout the world. Box A-290, The Oil and Gas Journal, Tulsa, Okla.

WANTED: A man with technical and engineering training for the Industrial Products Department of a major Oil Company in the Ohio-Michigan area. In applying give information as to educational training, practical experience, and age. Box A-332, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: MECHANICAL ENGINEER who knows something about drafting. John Zink Company, 4401 South Peoria, Tulsa, Oklahoma.

SALES ENGINEERS, preferably with chemical or mechanical background, wanted by well-known industrial instrument company looking forward to post-war expansion. Work requires persistence and ability to cooperate as consultant with prospects rather than high pressure selling. Positions open in several sections of the country. Box A-347, The Oil and Gas Journal, Tulsa Oklahoma.

HELP WANTED

Experienced Abstracter. Permanent place. Blaine County Abstract Co., Watonga, Oklahoma.

DRAFTSMEN

For Process Piping on Oil Refineries

Applications solicited from men not now employed in essential work or those completing essential work who have Statements of Availability

ARTHUR G. McKEE & CO.
2300 Chester Avenue
Cleveland, Ohio

WANTED: Mechanical Engineer with diesel engine and centrifugal pump experience. College graduate preferred. Essential work, permanent job, work located in Southeast. Give all details in first letter as to age, education, experience, small photograph, and salary expected. Write Box A-378, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEER DESIGNER

Well-equipped iron and steel plant in New Orleans now manufacturing ship parts—with structural steel, machine shop, and drop forge facilities—requires experienced designer of oil-field drilling and production equipment and oil refinery equipment. One thoroughly grounded in welding fabrication, both manual and automatic, preferred. The man we want must be capable of designing a product—and following it through production. Please give details of activities over past 10 years, send small photo and advise salary expected.

George Irving Machine & Iron Works
3426-30 Short Street, New Orleans, La.

SITUATIONS WANTED

AMBITIOUS registered professional engineer desires several good lines refinery equipment to handle in conjunction with engineering practice. Wide acquaintance in Mid-Continent and Gulf Coast. Also interested in purchasing partnership or interest in reputable going concern. Dallas or Houston areas. Reply to Box A-376, The Oil and Gas Journal, Tulsa, Oklahoma.

NATURAL Gas Engineer desires change. Fifteen years experience with majors and independents in engineering, contracts, measurement, accounting and taxation for gas and distillate fields, gasoline and cycling plants. Particularly familiar with unitized operations. Box A-372, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

MEXICO: College graduate in law [illegible] now 45 years old, desires to locate in Mexico City because of climate and representation manufacturers of oil field supplies or other on a drawing account commission basis. Experience eight years on Wall Street, New York, and nine years as independent oil producer in Louisiana, Arkansas, and Illinois. Box A-229, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM and Chemical Engineer available. Nineteen years experience; Natural Gasoline, Recycling and Refining work; Chief-Chemist; Chief-Operator; Stillman; Alkylation and Isomerization; Engineering work on topping and cracking units; Process Engineer, Box A-301, The Oil and Gas Journal, Tulsa, Okla.

SUPERINTENDENT Production. 17 years experience in development and oil production including gas repressuring and water flooding. Engineering training and experience. Familiar with rotary and cable tool operation and remedial work on wells. Desire position in Mid-Continent. Age 35. Available 1-1-45. Box A-319, The Oil and Gas Journal, Tulsa, Oklahoma.

SUPERINTENDENT—Years of experience in production supervision, sober, reliable. Can make your property produce profits possible from efficient operation. References. Box A-353, The Oil and Gas Journal, Tulsa, Okla.

RIVER TRANSPORTATION man of wide experience desires position as superintendent or Assistant of river transportation department. Now employed by Major company. Can furnish A-1 references from present and past employers. Write Box A-370, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Petroleum Engineer; draft exempt. Experienced in drilling and production. Prefers sales engineering position with equipment company or connection with independent operator. Will consider foreign employment. Box A-368, The Oil and Gas Journal, Tulsa, Okla.

LAND MAN, leasing, blocking, expert in title work available to go anywhere, best references, wants connection with oil company. Box A-366, The Oil and Gas Journal, Tulsa, Oklahoma.

TWENTY years, experience in operation, topping, cracking, gas compression and recovery, light ends fractionation, light and heavy treating. Have statement of availability. South or west. Box A-365, The Oil and Gas Journal, Tulsa, Oklahoma.

COMMERCIAL PILOT, age 37, 2600 hrs., instrument rating; O-6600 H.P. rating; One year testing B-24s; would like position with oil company. H. J. Tunstall, 3218 Wingate, Fort Worth, Texas.

YOUNG MAN, married, veteran, approximately six years Mechanical Engineering Background. Some drafting knowledge. Familiar with Technical aspects of machine shop practices and supervision. Wishes position with Oil or Steel Firm in Texas or Oklahoma. Must have postwar future. References. Box A-354, The Oil and Gas Journal, Tulsa, Okla.

EXPERIENCED LANDMAN, ex-service man, wants permanent connection with substantial oil company or independent operator. Address Box A-187, The Oil and Gas Journal, Tulsa, Okla.

DRILLING Superintendent, now working, would like to contact an individual or company who has drilling rigs and would like to make a deal for some one to lease after them for an interest. The reason for wanting to change is to go into business for myself. I have had sixteen years experience with drilling contractors and can furnish the very best of references. Box A-374, The Oil and Gas Journal, Tulsa, Okla.

CONTROLLER
Assistant to President

Executive accountant and administrative assistant with large organization desires change. Thoroughly experienced and qualified to effectively direct accounting and production control functions, and interpret operating results. Can analyze factual information and initiate steps for improving profits. Broad experience in industry and successful record in gettings things done. Age 38. Connection desired with progressive manufacturing company.

BOX A-377
THE OIL AND GAS JOURNAL, TULSA, OKLA.